DEFENSE SYSTEMS MANAGEMENT COLLEGE

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NDI ACQUISITION

AN ALTERNATIVE TO "BUSINESS AS USUAL"

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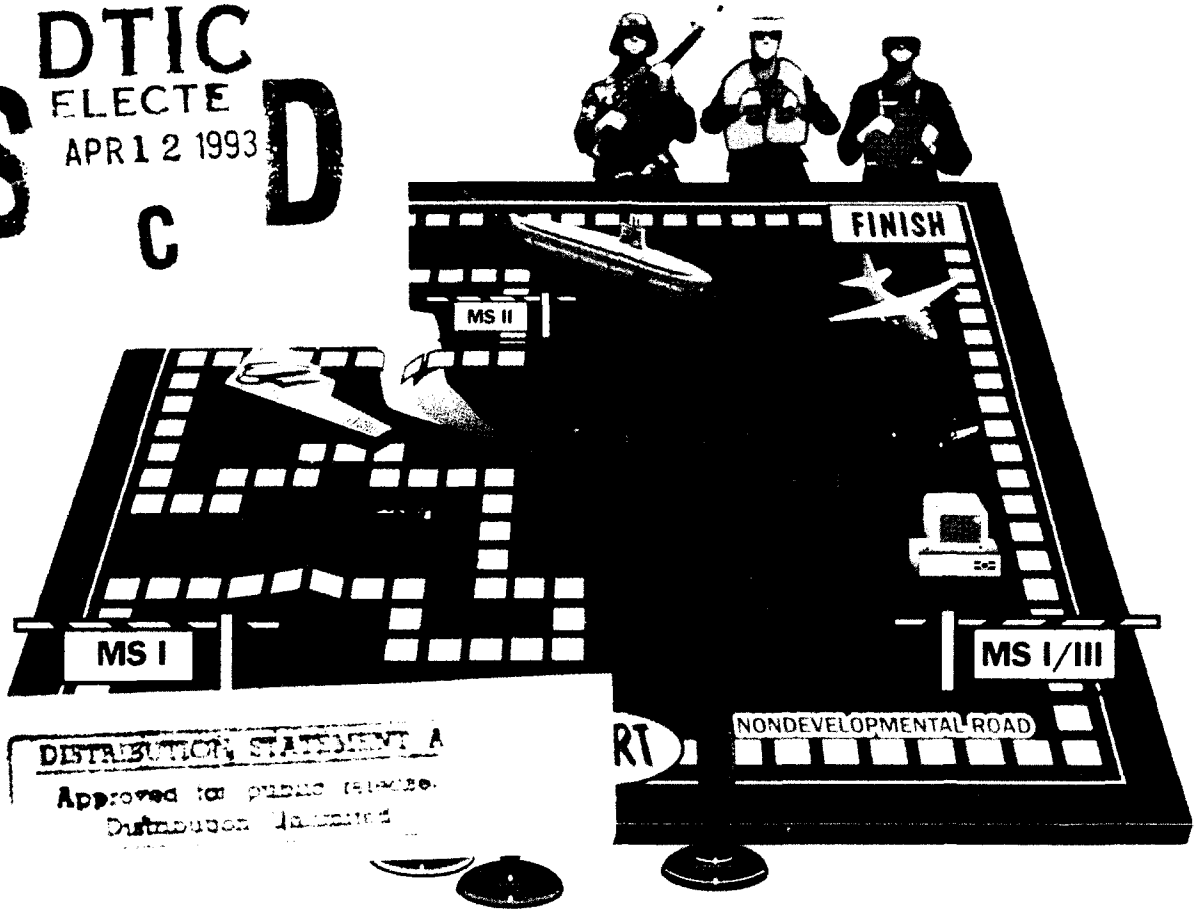

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The Report of the DSMC 1991-92 Military Research Fellows

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This document presents a snapshot of the status of NDI acquisition activity within the DOD as of the spring of 1992. The text begins with an introduction to nondevelopmental item acquisition; how it is defined by the Congress and the Services; and, finally, what legislation and emphasis have supported the concept during the last several years. Following the introduction, the specific topics including requirements generation, specifications and standards, test and evaluation, integrated logistics support, and contracting issues are addressed in detail. Each chapter addresses how the "business as usual" elements of each area should be viewed differently for an NDI acquisition.

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DEFENSE SYSTEMS MANAGEMENT COLLEGE

NDI ACQUISITION:
An Alternative to "Business as Usual"

REPORT OF THE
DSMC 1991-92
MILITARY RESEARCH FELLOWS

LTC CHARLES J. ADAMS, USA
LtCol BRUCE G.P. HEVEY, USAF
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"If we continue with [defense] business as usual, we soon won't be doing much business at all."

Chairman Les Aspin
House Armed Services Committee

PREFACE

This study ends an 11-month, senior Service college research program of three military Research Fellows. At the direction of the Under Secretary of Defense for Acquisition, the program has dual purposes: first, to provide professional military education for selected officers from the Army, Navy and Air Force; and second, to conduct research in a subject of interest to the U.S. defense acquisition community. In keeping with its role as the center for systems management education in the Department of Defense (DOD), the Defense Systems Management College (DSMC), cooperating with the Harvard Business School, provided the means for conducting this study. The program includes a 12-week resident Program for Management Development (PMD) course at the Harvard University Graduate School of Business.

We could not have undertaken a project of this size without the cooperation and contributions of many people. During the writing of this report, we have been genuinely thankful for their help. The faculties and staffs at Harvard and DSMC have been extremely helpful with their support.

There are several people we specifically thank. First, Lieutenant Colonel Joe Emerson, USA, whose research efforts, particularly in the area of Army aviation programs, provided valuable insight. Thanks to Mr. Calvin Brown and Mr. Norman McDaniel of DSMC for their guidance on nondevelopmental item (NDI) acquisition. Special thanks to Ms. Chris Metz of the Office of the Assistant Secretary of Defense (Production and Logistics) who has probably done more than anyone in the Department of Defense to facilitate NDI acquisition. Despite a heavy workload, she always was willing to talk with us or review drafts. We extend sincere appreciation to Ms. Joan Sable, program coordinator, who ensured that our administrative and logistical needs were taken care of at DSMC and Harvard. She contributed to this report as writer of the section in the introduction outlining history of NDI acquisition. Without Joan's support, we could not have focused on our primary task, the actual research and writing of this report.

We appreciate efforts of the Publications staff for their many hours working on this report to ensure it is of the high quality produced by DSMC. Thanks to the Visual Arts staff for their work on the graphs, charts and cover page as well as their many hours in the layout of this report.

EXECUTIVE SUMMARY

The world today is drastically different than it was 5 years ago. The fall of communism in Eastern Europe and the disintegration of the Soviet Union have significantly changed the basis for, and goals of, our national security strategy. The lack of a significant threat, perceived or real, and the state of our national economy left us in a position where our defense budget is being severely squeezed. The limited funding levels we are receiving and the forecast of even smaller budgets demand that we get the most for every dollar we spend. The Congress, although not a model of efficiency, is demanding changes in the way the Department of Defense (DOD) conducts its business. Congressman Les Aspin's quote on "business as usual" indicates the attitude of Congress concerning DOD's business practices. DOD has taken positive steps during the last several years to increase its efficiency, particularly within the systems acquisition arena. Increased use of nondevelopmental items (NDI) to meet new requirements is one area that has had significant emphasis from the Congress and the DOD.

This document presents a snapshot of the status of NDI acquisition activity within the DOD as of the spring of 1992. The text begins with an introduction to nondevelopmental item acquisition; how it is defined by the Congress and the Services; and, finally, what legislation and emphasis have supported the concept during the last several years. Following the introduction, the specific topics including requirements generation, specifications and standards, test and evaluation, integrated logistics support, and contracting issues are addressed in detail. Each chapter addresses how the "business as usual" elements of each area should be viewed differently for an NDI acquisition. The last chapter, "Final Thoughts," presents our personal feelings on how the NDI acquisition situation today could be enhanced. In this summary we present only key points from the functional-area chapters and a brief synopsis of the final thoughts.

DEFINITION

During the years, the definition of NDI has varied among the Congress, the Department of Defense, and within the Services. A basic definition suggests NDI is a broad, generic term that covers material available from a variety of sources ith little or no development effort required by the government. The Congress identifies an NDI as: (1) any item available in the commercial marketplace; (2) any previously developed item in use by the U.S. Government or cooperating foreign governments; or (3) any item of supply needing only minor modifications to meet DOD requirements.[1] The NDI acquisitions provide major benefits as well as challenges to the systems acquisition process and the user. Benefits include: quick response to operational needs; elimination or reduction of research and development costs; application of state-of-the-art technology to current requirement; and reduction of technology, cost, and schedule risks. The challenges that NDI acquisitions present include the possibilities of items, developed for other than DOD needs, not meeting all user requirements and mission performance trade-offs being required to gain the advantages from pursuing NDI alternatives. Additional challenges include providing logistics support, product modifications and continued product availability. Decisions governing operational requirements trade-offs require user reviews and approval.[2] The

NDI acquisitions benefit the systems acquisition process in reducing risk and development costs. These benefits may be offset by performance trade-offs.[3] The user will definitely benefit with the prompt availability of an item as well as the savings from reduced risk and cost of development. The user may benefit from these savings even though there may be a marginal increase in performance possible from a full developmental program.[4]

BACKGROUND

Since the early 1970s, several studies have supported the increased use of NDIs by DOD. The President's Blue Ribbon Commission on Defense Management (the Packard Commission) was a major turning point in the history of NDI acquisition. The 1986 report reviewed and brought new emphasis to earlier studies advocating NDIs. The commission took the position that "DOD should make greater use of components, systems, and services available off-the-shelf. It should develop new or custom-made items only when it has been clearly established that those readily available are clearly inadequate to meet military requirements." Regarding military specifications, the commission asserted that products developed strictly for military use and to military specifications generally cost more than commercial counterparts and that adherence to these specifications was often needless and wasteful. It recommended the Defense Acquisition Executive require program directors/managers to receive a waiver before using a product made to military specifications if there is an available commercial counterpart. The commission findings were echoed again in the *1989 National Security Review on Defense Management*. Finally, the Congress has implemented specific language concerning use of NDIs in recent authorization and appropriation acts in order to ensure that its NDI concerns are addressed by DOD. For its part, DOD has provided new guidance on NDI acquisition in the recently published DOD 5000 series acquisition directives. The DOD published additional handbooks and guides relating to increasing the efficient use of NDI in meeting their requirements and established additional training programs to carry the NDI message to their acquisition professionals. In fact, this report is an extension of DOD's efforts to promote NDI acquisition.

REQUIREMENTS GENERATION

The conception of any acquisition program lies in the identification of a need for a system to meet a military requirement. This need or requirement is expressed by the using Commands in terms of operational requirements documents. Once these requirements are generated and validated, the developing or procurement Commands are tasked to find the system or component that will meet the requirement. Following the guidance of DOD Instruction 5000.2, the developers are to look first at using existing systems "as is" or modified to meet the requirement. If an existing or modified system can meet the stated requirements, we essentially have an NDI program; if not, we are probably on our way to a lengthy developmental program. The focus of the requirements chapter is how we manage the requirements process to favor an NDI solution.

In order to maximize the use of NDI solutions to meet new military requirements, the requirements generation process must be altered to include the developing/procuring agency in the process at the beginning. Using market analysis, including market surveillance and market investigations, the developing community can work with the user to evaluate available equipment versus the ten-

tative requirements as the requirements-generation process goes on.

The Air Force Joint Command, Commercial Off-The-Shelf Supportability Working Group (CSWG) conducted a study of the requirements-generation process for commercial items in 1989 and 1990. The first major problem identified by the working group was that "initial requirements documents are developed without careful consideration of what is currently available as NDI. This can happen when the operational community develops the requirements document focusing only on the operational needs independent of 'solutions' to these needs. Once these documents are developed, it is difficult for the user to 'back off' from validated requirements and accept an available NDI solution which does not meet all of the stated requirements." Modified NDI or not using NDI often is the result.

One of the keys to avoiding this pitfall is maintaining flexibility as the operational requirements are determined. This flexibility must be pursued by both organizations through cooperation, coordination and communication. The developer must be responsive to legitimate needs of the user; but the acquisition agency must be fully conscious of the technical risks, affordability constraints and schedule impacts. The users must be realistic in stating their requirements and considering viable trade-offs. After weighing the benefits of proven capability and more rapid deployment of the intended system against performance limitations, the user must determine, with the acquisition agency, whether the trade-offs are acceptable.[5]

The acquisition agency must provide the user with accurate market analysis data, upon which the user must evaluate the effectiveness and suitability of the NDI or refine the requirements of the desired system or component. The market analysis should be a two-phase process: market surveillance and market investigation.

Market surveillance is defined as the ongoing process of the acquisition agency to canvass the technology and product developments in its areas of expertise. While market surveillance is not seeking to fulfill a specific need, it is essential to maintain a viable technology basis. A good market surveillance involves subscribing to trade journals, reading manufacturers' catalogs, new product announcements, industrial shows and conferences, as well as unsolicited proposals. The depth of the market surveillance is dependent upon the complexity of the component or area of expertise.[6] A necessary change in the acquisition process, particularly in using NDIs, is that the market surveillance be an ongoing function and not dependent on a request for information to support a user's needs.

The user must be educated in effectively evaluating the market analysis information. The user must not be afraid to accept trade-offs of the requirements. The user's knowledge of the iterative review process for evaluating the market capabilities and realities will aid in determining cost-effective solutions in today's shrinking budget.

By using up-to-date market information on current technology maturity and developed products, it is possible for the user to match requirements with market availability and to make a knowledgeable assessment of whether these requirements should be reshaped to accept what is available from an NDI acquisition or if there is justification for a developmental program.[7]

Therefore, the new mind-set must recognize the unique characteristics of an effective NDI process: (1) meeting user requirements, (2) continually refining and tailoring user requirements to prevent gold plating, and (3) opening advanced technology doors closed to DOD in the past while keeping pace with changing threats.

SPECIFICATIONS AND STANDARDS

Approximately 30,000 military specifications (MILSPECS) and military standards (MILSTDS) now exist.[8] These military specifications and standards traditionally have been interpreted as being the basis for today's superior military equipment. Thirty to forty years ago, these MILSPECS and MILSTDS were a necessary part of military acquisitions. However, in today's high-tech environment, the continued requirement to stipulate MILSPECS and MILSTDS in DOD procurement is a severe impediment to the use of NDI systems or components.

Even with the emphasis on NDI acquisitions, use of commercial practices and other acquisition streamlining initiatives, there are many who cling to the "security" of MILSPECS and MILSTDS. Despite guidance from the Packard Commission, changes in public law and even within DOD policy guidance, resistance to giving up the "boilerplate" military standards continues in deference to good and complete commercial standards.

While the use of strict noncommercial standards are applicable in some extreme environments or in special cases such as nuclear technology applications, the commercial standards applied across-the-board in the marketplace today are in many cases well within the intended military application requirements. The successful use of commercial off-the-shelf computers and Global Positioning System (GPS) receivers in the Persian Gulf conflict provided vivid testimony to the effectiveness of commercial equipment in a harsh, military environment.

We are no longer using MILSPECS to ensure that a system or component meets the performance requirements of the user. Often MILSPECS are used to instruct world-class, high-tech quality producers in "how to" make items desired by DOD. This "how to" culture of the DOD and Service acquisition agencies is restricting or eliminating advance technologies from the military. No longer can the Services demand or afford the "how to" specifications that, in the past, were necessary to ensure superior equipment.

The defense industry now crosses many technology borders. Restricting defense manufacturers by requiring conformance to often out-dated specifications or specifications which restrict creative thinking on the part of the contractor has traditionally cost DOD and the Services time and money. Appendix A presents an actual case study of a clothing manufacturer extremely successful in the commercial marketplace, yet failed to successfully produce similar clothing when directed to use MILSPECS. This is a good example of why performance specifications must become the norm rather than the "how to" specifications which often tie a good contractor's hands or result in significant cost increases when conducting business with DOD. The DOD must break the "mind-set" and cultural mold that says that military specification equipment is superior to comparable commercial items.

The drive within the defense industry to use dual-use items will become a higher-priority issue with the shrinking industrial base. The fact that the Critical Technology Lists of the Department of Commerce and the Department of Defense now contain 80 percent of the same critical technologies should dictate what direction the DOD and Services should take. The inclusion of dual-use technologies will allow industry to be more flexible to the military procurement process, allow the military to close the technology gap that exists between military and commercial items, and allow the defense industry to remain competitive in the international marketplace.

TEST AND EVALUATION

The role of test and evaluation (T&E) in an NDI acquisition is exactly the same as in a typical development/procurement acquisition program. That role is to provide information for risk identification and assessment, to verify attainment of technical performance specifications and objectives, and to verify that systems are operationally effective and suitable for intended use.[9] The test and evaluation process includes test planning, primarily visible through the development of the Test and Evaluation Master Plan (TEMP), Developmental Test and Evaluation (DT&E) and Operational Test and Evaluation (OT&E).

The entire test planning process is focused around one major document, the TEMP. It is the basic summary document that describes the test program, is developed early in the acquisition program and is updated annually or at each milestone. The TEMP is the responsibility of the program management office; however, it is developed as a team effort with the applicable independent operational test agency for the specific program.

Developmental test and evaluation has specific goals. These include:

1- Identifying potential operational and technical limitations of alternative concepts and design options,
2- Supporting the identification of cost-performance trade-offs,
3- Supporting the identification and description of design risks,
4- Substantiating that contract technical performance and manufacturing process requirements have been achieved, and
5- Supporting the decision to certify the system ready for operational test and evaluation.[10]

These goals are met through several forms of DT&E during the acquisition cycle performed by the contractor and/or the government development team.

Operational test and evaluation (OT&E) programs have the purpose of determining the operational effectiveness and suitability of a system. The OT&E is conducted by an operational test agency (OTA), independent of the contractor, program management office or developing agency.

The extent of a test and evaluation program for an NDI acquisition depends on several factors such as the type of NDI, similarity of intended use and environment to current use, the degree of current use of the proposed system, and the amount and quality of test data available from the original system development. In all cases, the T&E program must fulfill the basic tenant of T&E—risk definition. The program must contain enough testing to define risk in terms of how the system meets the functional specification in the intended operational environment. In addition, the program must adequately define the system's operational effectiveness and suitability. Most important, a proposed program should maximize the advantages of an NDI approach. Time and cost savings basic to an NDI approach can't be tested away through the T&E community's zeal for testing and risk elimination. The T&E community must look at the basis of a T&E program as risk management, not risk elimination.

Test and evaluation, especially evaluation, must be a part of the market investigation. The developers, users and independent testers should play parts in this early, but very important, test and evaluation activity. Remembering that the market investigation is accomplished to determine the availability and feasibility of an NDI solution, any testing conducted during that phase should be limited and should serve only that purpose. It should not compare different systems but only verify availability and feasibility.

Assuming a market analysis recommends use of an NDI solution, the remaining T&E requirements must be determined and documented in the TEMP. Once again, developers, users and independent operational testers

must participate as team members of the Test Integration Working Group (TIWG) in tailoring the test requirements and execution strategy.

The T&E community recognizes four major areas of risk concerning the testing of NDI systems. The first is that requirements may not be clearly understood. The second area of risk is definition of the operational environment. If the operational environment and forecasted use of a system is not clearly defined, it will be impossible for the T&E community to test or evaluate to a comfortable level of confidence. The third area of risk is associated with the clear definition of system interfaces and interoperability between the NDI system and others it must interface or operate with.

Because an NDI system may have to operate with or within other systems it was not concurrently developed with, the interfaces and interoperability issues can either falsely disqualify or qualify the NDI system. The final area of risk is that documentation and support issues may not be sufficiently covered in the NDI test program, thus allowing the Service to commit to a system that may not be operationally suitable or supportable without more development or supportability work being accomplished. This often is not a "show stopper" in the long term of a system's deployment, but can certainly slow down or stall the initial fielding and utilization.

In addition to risks associated with an NDI program, there are impediments to efficient development and execution of an NDI test and evaluation program. The first impediment is basic to many aspects of an NDI program—mind-set. In testing, like all traditional functional areas, the T&E community has been oriented toward traditional developmental approaches. It is often difficult to reorient the thinking of the testers to a non-traditional, NDI approach. The second impediment feeds the mind-set problem—lack of knowledge or experience with commercial test practices and standards. If the test community doesn't understand how commercial or other product developers have tested their systems or have a complete understanding and confidence in the testing standards, they naturally will want to repeat tests in the traditional military manner and to familiar standards.

In an NDI program, depending on the previous usage of the item in question, a T&E program can be significantly tailored, thus contributing to the time and cost savings associated with an NDI strategy. There are risks and impediments associated with a tailored NDI test and evaluation program which must be considered and mitigated as much as possible. The bottom line always should be that the T&E program effectively provides data and analysis to determine whether or not the NDI system is operationally effective and suitable in the intended environment.

INTEGRATED LOGISTICS SUPPORT

Integrated logistics support (ILS) is defined as "a disciplined, unified and iterative approach to the management and technical activities necessary to integrate support considerations into system and equipment design; develop support requirements related consistently to readiness objectives, to design, and to each other; acquire the required support; and provide the required support during the operational phase at minimum cost."[11]

Effective ILS poses a challenge in developmental programs. The ILS in an NDI acquisition can be significantly more difficult because of the differences in an NDI acquisition process. Since the acquisition lead time is reduced, there is less time available to plan for and develop organic support. However,

unlike a developmental item, an NDI may have support as well as "real" reliability and training data in place. Nondevelopmental items ILS may be impacted adversely by proliferation of hardware and software changes since DOD may not acquire the technical data rights to maintain configuration control of commercial items.

Acquisition personnel must understand implementing effective ILS for NDI probably will require a departure from "normal" procedures of a developmental-item acquisition, and they must seriously consider trade-offs when deciding to adopt an NDI acquisition strategy.

The market analysis should provide sufficient information to allow supportability to be thoroughly considered in the trade-off process. It is critical in this analysis that the focus remain on products available in the commercial market instead of technology availability. While the focus is on available products, a thorough examination of product supportability is required.

It is important to ensure all critical ILS-related requirements are identified so they can be included in subsequent testing. Sources of existing data relative to critical ILS-related requirements should be identified and coordinated with ILS personnel representing the user, the program office, and the test community for inclusion in the TEMP.

To ensure ILS is incorporated effectively during the NDI acquisition process, a thorough and coordinated Integrated Logistics Support Plan (ILSP) should be developed in conjunction with developing acquisition strategy. The ILSP should consider all ILS elements, including establishment of milestones for each element.

During the ILS planning process, trade-offs should be made regarding how the NDI will be utilized relative to other programmatic considerations. Decisions on how the NDI will be supported will result from this trade-off process. These decisions must be made including the consideration that there may not be an "ideal" solution to support an NDI. As long as the concerns are recognized and the ILSP is structured to optimize the risks they present, effective ILS can be achieved for the life of the NDI.

As the ILS planning process occurs, support decisions are incorporated into the overall acquisition strategy. The issue of contractor versus organic support is a critical decision. Potential benefits of contractor support are recognized in the DOD and included in DODI 5000.2.

The culmination of the ILS planning process is the blending of logistics needs into the requirements and procurement documents. All functional requirements, including supportability, must be clearly spelled out; and potential offerors must be told what information relative to ILS must be included in their proposals. Support objectives for the NDI, developed during earlier stages of the process, should be included in the NDI source-selection criteria.

To overcome inherent problems relative to technical data in an NDI acquisition, effective communication with potential industry sources must take place as early as possible. Depending on industry's willingness to provide data, upon which it may rely as a competitive advantage, or its ability and willingness to format that data as required by the government, the feasibility of pursuing an NDI acquisition will be apparent. Options which help overcome an incomplete technical data package include use of warranties and data rights escrow.

The continuing exchange of information between government and industry in the market analysis process, provides for the iterative generation of a maintenance concept as part of the support strategy. The resultant decision to use organic support, contractor support or a mix as an interim or long-term measure is a product of the trade-off process.

The decision on the level of repairs performed and who will perform them (contractor, organic, mix) will have a direct impact on spares/repair parts requirements. Availability of technical data for the breakout of reprocurement/spares will influence sources of supply support. The government's insistence for detailed technical data may cause potential offerors of highly desirable NDIs to refuse to offer their products. An effective method to provide supply support to commercial items, the contractor-operated parts depot (COPAD), has been in operation within the Defense Logistics Agency since 1980. The COPAD provides an excellent example of how effective supply support can be provided to NDI users.

If the possibility exists that production and support might cease before a time desirable by the government, several options exist. The government may want to buy upgrades as commercial models evolve. Another alternative is a one-time purchase of spares. Finally, arrangements can be made to obtain technical data sufficient to solicit sources of supply support concurrent with the end of the manufacturer's production/support.

The ILS is one of the toughest challenges in NDI acquisition. Potential supportability problems must be addressed early in the NDI acquisition process. Thorough planning is critical to ensuring effective ILS. Sound logic must overcome the "business-as-usual" mind-set.

CONTRACTING

The process for buying NDI is generally governed by the same regulations and laws that govern procurement of developmental items. Differences existing between the two processes arise from differences in source of the item and the contracting environment in which that source functions. These differences provide the greatest challenges and opportunities relative to contracting for NDI.

The degree of competition available, contract type and procurement method are several contracting-related considerations which must be weighed when preparing the acquisition strategy. The acquiring activity must thoroughly understand the requirement including the environment in which the item ultimately will be used. In addition, the acquiring activity must have knowledge of available items to fulfill the requirement and an understanding of the industry and market from which the items come. Only after developing an adequate understanding and definition of the requirement and accurately assessing the market can informed contracting-related decisions be made.

Three procurement methods available to the government are sealed bidding, two-step sealed bidding and competitive proposals. The sealed bidding procedure requires adequate market surveillance, investigation and analysis to confirm that any commercially available products satisfy the requirement. Two-step sealed bidding provides for an examination of technical proposals (step one) and, then, bids obtained from offerors that submit acceptable technical proposals (step two). The proposals may contain a wide range of technically acceptable offers, some being superior to others; however, award is made to the *lowest-priced offer*, even if the price difference is minimal.

Another procurement method appropriate for an NDI acquisition is the competitive proposal. With sealed bidding and two-step sealed bidding, the primary determinant for award is the low bid from a responsive, responsible offeror. When using competitive proposals, this may not be the case. Using this procedure, awards can be based primarily on technical merit rather than just low cost/price.

This "best value" approach was recognized by the Congress as being both difficult to quantify objectively and extremely important

to successful, effective government procurement. The Congress has given DOD some assurance that it could award on this basis without discussions and fear of adverse General Accounting Office (GAO) decisions.

One key to effective use of the competitive proposal procurement method is good communication. There must be good communication among all members of the acquisition team so that the total requirement is understood. They must, in turn, communicate the "values" in the solicitation to prospective offerors so that they can be thoroughly addressed by the offerors in their proposals and, subsequently, evaluated by the source-selection team.

In an NDI acquisition, the utilization of level-three drawings or precise design specifications are an impediment. Other impediments to the procurement of NDI are requirements for certified cost or pricing data, lobbying certifications, socioeconomic certifications, government auditing rights and flowdown of clauses to subcontractors. Many of these contractual impediments are statutory. Attempts were made by DOD and the Congress to remove these impediments; unfortunately, studies and articles recently written indicate these impediments continue to limit DOD's use of commercial products.

The enormous growth of federal and defense procurement, with associated problems of managing the growth, and the unfortunate cases of contractor fraud that arose led to the statutory creation of cost-accounting and certification requirements designed to ensure the federal government was paying fair and reasonable prices on its contracts. Unfortunately, it created a system separate and quite different from that in the commercial sector. The statutory requirement for certified cost or pricing data has a stifling effect on potential commercial suppliers. Some commercial vendors' cost-accounting systems are not structured to allow them to properly complete a Standard Form 1411, (Contract Pricing Proposal Cover Sheet). Moreover, the exemption based on commercial use often is applied differently by each contracting officer.

The requirement for certified cost or pricing data and compliance with cost-accounting standards (CAS) are major impediments when the government wishes to buy state-of-the-art technology from the commercial sector. To be exempt from CAS and submission of certified cost or pricing data, the contractor's price must be "based on established catalog or market prices of commercial items sold in substantial quantities to the general public." [12]

The DOD has proposed regulations that would allow producers to waive requirements for certified cost or pricing data and, also, streamline exemption procedures. Another recent change which will help reduce this impediment is raising the threshold from $100,000 to $500,000 for submission of certified cost or pricing data for negotiated contracts and all modifications.

Another issue is the number of clauses DOD includes in its solicitations and contracts that must flow down to contractors and subcontractors. The Congress directed DOD, to "develop a simplified uniform contract for the acquisition of commercial items by the Department of Defense and shall require that such simplified uniform contract be used for the acquisition of commercial items to the maximum extent practicable."[13] It also required DOD to restrict the clauses that a prime could flow down to a subcontractor. The effort by DOD to develop a simplified uniform contract for commercial-item acquisition, combined with policies and procedures outlined in DFARS 211.70, is a substantial step forward in removing a major impediment to acquisition of commercial items. However, DOD was able to solve only a portion of the problem. Approximately 77 of the 136 provisions/clauses are required by statute or executive order. The Congress must admit it is part of the problem, and either accept the con-

tractual limitations on acquisition of NDI due to congressional requirements, or realize that commercial-item purchases by government agencies should be exempted from requirements of law that normally do not apply to contracts in the private sector for those commercial items.

The differences in contracting philosophy reflect a greater difference in the overall acquisition philosophies between private industry and government. It is impossible to reconcile differences in the goals of maximum profits and growth versus welfare of the general public. Only through continued constructive dialogue between industry, DOD and the Congress can specific impediments be addressed and resolved to the maximum extent acceptable to all parties.

FINAL THOUGHTS

We feel that, while the DOD is fully committed to increasing the use of NDI in meeting its new mission requirements, there is room for improvement. Policies have been established and directives and handbooks published, all focusing on increasing the use of NDI. However, it is with the implementation of these policies that we have recognized some shortcomings.

Perhaps it is time to de-emphasize the importance of "NDI" as a hard term in DOD acquisition and shift the concern to simply advocating the basic tenants of NDI to a wider range of programs. In addressing new-start acquisition programs, DODD 5000.1 says the Services should first attempt to use an existing or modified U.S. military, allied military, or commercially developed system, fostering a nondevelopmental acquisition strategy. Only then can a research and development program, either cooperative with an allied nation, another Service, or Service specific, be considered. The whole message here is not to develop something if it already exists or if the Services can easily modify something else to meet the requirement.

Today, once a program is labeled "NDI," traditional acquisition rules and functional-area strategies are tailored, waived or deleted in the interest of efficiency. It is important to realize that these special NDI rules can apply to nearly every program DOD initiates, the only variable being the degree to which they apply. Why not apply these "smart ideas," as much as practical, to every acquisition program, not just the ones that fit into the "NDI box"? In some cases, where programs do fit in the "NDI box," program managers are hesitant to make prudent trade-offs on development vs. performance, for fear of not remaining within the tight constraints of the nondevelopmental definition. Even in NDI programs, cost/performance trade-offs should be made. When it is smart to do minimum development work on an existing system to achieve a lot more performance and it's viable in terms of life-cycle cost, it should be strongly considered. Whether or not the development work violates the definition of an NDI program shouldn't be important, the cost/performance efficiencies of the development are what should drive a decision. Unfortunately, this is not the case today. In several cases, development was avoided or covered up in the interest of staying within the NDI definition. Program managers should not be burdened with the administrative or policy requirements which define the type of their programs; they should, instead, be burdened with the full responsibility to efficiently manage their programs. Program managers should be challenged to make decisions on development vs. available technology throughout their programs, regardless of how closely it meets the NDI definition. Rather than making an NDI strategy decision up front, NDI acquisition trade-offs and the use of NDI-type streamlining management concepts should be reviewed at each milestone.

The concept of zero basing specifications must be strongly supported and implemented. The desire for acquisition agencies to use commercial item descriptions (CIDs) in place of the stringent "how to" military specifications will promote the continued use of NDIs. This initiative will require the Services to perform market analysis more actively in order to justify the requests for the use of noncommercial specifications. The market analysis will allow the Services access to the state-of-the-art technologies which, in the past, have not been available to the military without a significant penalty in cost and risk.

The Services must be aware of the defense industry's position in the world marketplace. The fact that the critical technologies lists of the Departments of Commerce and Defense have merged in the past years should indicate to the military acquisition agencies that there is a valid need to change the culture of the acquisition communities regarding the superiority of military equipment when compared to today's high-quality commercial products. The Services must recognize the benefits, both from cost and risk bases, that the use of dual technologies provide to the military acquisition communities.

The cultural aspects confronting the implementation of NDI acquisitions will be difficult to overcome. There is an inconsistent level of knowledge in the lower levels of the DOD acquisition work force regarding the use of NDI. The knowledge of the lower-echelon individuals often is based on the cultural "this is the way it's always been done" attitude, or the "hands-on" training previously prevalent in the acquisition work force. The cultural aspect is so strong and deeply rooted in the work force that we often could label individuals as impediments to NDI acquisitions solely on their past cultural experience. This is not to say that the individual is always at fault, but the system has a major hurdle to overcome if NDI is to become a way of doing business within DOD acquisitions. Creation of a career path for acquisition personnel is a first step. However, without adequate education in using NDIs, they will probably fall prey to the same bureaucratic pitfalls that ended past acquisition initiatives to change the way DOD conducts business.

ENDNOTES

1. "Preference for Nondevelopmental Items" provision of the FY 1987 Defense Authorization Act.

2. SD-2, *Buying NDI*, October 1990.

3. *Ibid.*

4. *Ibid.*

5. *Ibid.*, p. 2-4.

6. Defense Standardization Program, *Market Analysis for Nondevelopmental Items (SD-5)*, Office of the Assistant Secretary of Defense (Production and Logistics), February 1992, p. 5.

7. COTS CSWG, p. 17.

8. *Ibid.*

9. DODI 5000.2, p. 8-2.

10. DODI 5000.2, p. 8-4

11. DODI 5000.2. p. 15-7

12. *Federal Acquisition Regulation (FAR)*, para. 15.804-3(c) and 30.201-1(b)(6).

13. Public Law 101-189, **"The National Defense Authorization Act for Fiscal Years 1990 and 1991,"** Section 824(b)(2).

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"I am confident, however, that by working together, the Congress, the Department of Defense, and industry can remove the current impediments to NDI acquisition."

—Senator William S. Cohen, R-Maine
U.S. Senate Subcommittee on Oversight
of Government Management, 1989

Chapter 1

NONDEVELOPMENTAL ITEM ACQUISITION (NDI)

The world has undergone remarkable changes in the last 3 years. In the late 1980s, the shadow of communism veiled Eastern Europe and the "Evil Empire" image of the Soviet Union was seen as a significant threat to security of the United States and other free nations. Today, only North Korea, China, and Castro's Cuba remain as protagonists of communism. The Berlin Wall has fallen; Germany is unified; Saddam Hussein's ill-conceived foray into Kuwait has been countered effectively by a U.S.-led United Nations coalition; the flag of the Soviet Union was lowered from the Kremlin for the last time on Christmas Day, 1991; and the U.S.S.R. is no more.

While we still have South Korea, as well as Saddam and other Third World dictators to be concerned about, some of the biggest threats to the American way of life today seem to be our sluggish economy, the rising national debt, the illicit drug trade, the AIDS epidemic and depletion of the ozone layer. These threats are real and significant, but the focus in Washington has clearly been on election-year politics rather than leadership.

Within the defense arena, we are viewed as a formidable force without a formidable enemy. Cries for significant reductions in the defense posture following the fall of Eastern European communism and the Warsaw Pact were muffled by the Persian Gulf conflict. After our successful dispatch of Saddam, cries were renewed and finally became roars following the rapid disintegration of the Soviet Union. Faced with a mounting deficit and a faltering economy, the legendary "peace dividend" is sought more and more by politicians and taxpayers alike. Not understanding or believing Defense Secretary Richard Cheney's assertion that "the peace dividend is peace,"[1] the public and many politicians expect to see dramatic, immediate savings in the defense budget.

In response to the diminishing threat and fiscal hard times, the President and the Secretary of Defense implemented significant force restructuring actions they feel will continue to allow the Services to provide the military forces and equipment necessary to meet our current national security objectives while significantly reducing the defense budget. The reality of politics is that there are dissenting views in Congress on how fast and to what extent the Services should downsize, what the active/reserve ratios should be, what equipment should be developed or procured and,

finally, how we should acquire what Congress thinks the Department of Defense (DOD) needs.

As Congressman Aspin's quote on DOD business practices demonstrates, Congressional concern of how we acquire military equipment is not new, nor is it without reason. First, it is congressional responsibility to ensure the taxpayers' money is spent on necessary items in an efficient manner.

Secondly, the DOD had enough high-priced toilet-seat, coffeepot and hammer stories to engage the interest of Congress in its acquisition management practices. As a result, commissions have been established; studies have been conducted; laws have been enacted; and Congress has become intimately involved, all to improve defense acquisition management. Acquisition streamlining; using commercial buying practices; greater use of nondevelopmental items; and, most recently, prototyping and limited production strategies are initiatives the Defense Department implemented to meet military requirements in the most cost-efficient manner.

Although not a new concept, using nondevelopmental items has received a great deal of emphasis in recent years. Before discussing NDI, however, a distinction should be made between the acquisition of commercial items, which are a subset of NDI, and using commercial buying practices in DOD acquisition. Commercial buying practices in DOD acquisition are oriented toward adopting the processes a commercial company uses in conducting business, such as purchasing or product development. Acquisition of commercial items is oriented toward using commercially available products in the intended or a military-unique environment.

This report focuses on the current use of NDI acquisition within the Department of Defense. Our purpose is not to break new ground on the NDI process, but to document its status in the spring of 1992. As you may realize, we are in a dynamic environment; and things we write may be overcome by events before this document is published. We are trying to present the snapshot we saw during a short period of time. We focus on areas perceived to be key elements or impediments to an effective NDI acquisition process. Requirements generation, adoption of commercial specifications and standards versus military specification(s) (MILSPECs), test and evaluation, integrated logistics support considerations and contracting issues are the main areas we address.

This chapter should familiarize you with our study methodology, the definition of nondevelopmental items, benefits and challenges of an NDI acquisition, and the background and history of NDI acquisitions. Later chapters will concern each of the key elements or impediments mentioned above. Appendices include two Harvard University case studies describing both successful and unsuccessful applications of an NDI acquisition strategy. These cases highlight how some issues we describe were dealt with in effective and not-so-effective manners.

METHODOLOGY

We approached this project from four directions. First, while at the Harvard Business School, we discussed our topic with associates from the defense and commercial business sectors. We talked about their experiences in dealing with the government or DOD and how they felt business processes could be improved. We asked how their companies conducted similar acquisition activities in procuring systems or equipment for their use.

Secondly, we reviewed federal, DOD, and Service directives and handbooks; congres-

sional reports, testimony, and legislation; and other studies or articles dealing with NDI acquisition.

Thirdly, we developed a survey soliciting comments about specific aspects of NDI acquisition. We distributed it to DOD acquisition professionals at varied levels to get a sampling of knowledge and opinions.

Finally, we conducted dozens of personal interviews with government and private individuals involved in the acquisition process. We spoke with Service Acquisition Executives, Assistant Secretaries of Defense, senior vice presidents, program and project managers from both sides of the table, functional managers, program office workers and users. We asked questions, listened, and learned a great deal about this important facet of systems acquisition. We hope to convey some of that knowledge and improve the process through this report.

DEFINITION

Nondevelopmental item acquisition has been part of the systems acquisition process for the past 20 years. The definition of NDI varies among the military services and the Department of Defense. One definition suggests NDI is a broad, generic term covering material available from a variety of sources, with little or no development effort required by the government.

Congress identifies an NDI as: (1) any item available in the commercial marketplace, (2) any previously developed item in use by the U.S. Government or cooperating foreign governments, or (3) any item of supply needing only minor modifications to meet DOD requirements.[2] A commercial off-the-shelf (COTS) item is similar, yet unique, in its definition. The COTS items are commercial hardware/software items not modified by the government, are in the commercial inventory or production, have proved their performance in a similar environment, have an existing support structure, have an internal configuration that flows with commercial changes, and generally are integrated with other hardware/software items to become part of a system or subsystem capability.[3] Frequently, NDI and COTS definitions are misinterpreted. Commercial off-the-shelf items and NDIs are not synonymous. The COTS are only one category of what DOD considers NDI.[4] The definition of NDIs can be interpreted rather broadly. The COTS equipment is nondevelopmental, and there may not be a commercial support base for some nondevelopmental systems.[5]

Each military service has its definition and slightly altered application of how it handles NDI acquisition.

The Army has the following three distinct NDI categories: (1) off-the-shelf or basic NDI —used in the same environment for which items were designed and no development or modification is required, (2) NDI adaptation —products needing adaptation for use in an environment different from that for which they were designed (hardening, strengthening and related modifications may be required); and (3) NDI integration— integrating NDI components and subsystems. (*Note:* Although elements of this type of NDI are not developed by the Army, the resulting product requires research and development (R&D) efforts; i.e., testing, systems engineering, etc., to ensure user needs are satisfied.)

The Navy describes NDI as usually off-the-shelf or commercial-type products, but also may include equipment already developed by or for the Navy, other military services or foreign military forces.

Within the Air Force the standard DOD definition of NDI is used. There does, however,

seem to be much orientation toward COTS as the primary buzzword when discussing NDI activities. On several occasions, when beginning a discussion about NDI with an Air Force member, it was suggested that "you mean COTS." In fact, two major works by the Air Force in the NDI arena were *The COTS Book*, a handbook for COTS acquisition, and the recent report of the Joint Command Commercial Off-the-Shelf (COTS) Supportability Working Group. The "spectrum of possible NDI and their application varies from commercial off-the-shelf items like pocket calculators, to the adaptation of a major foreign weapon system."[6] The main problem areas noted in NDI acquisitions are clarification of what an NDI is and how to support NDI benefits and challenges.

Benefits and Challenges of NDI

The NDI acquisitions provide major benefits and challenges to the systems acquisition process and the user. Benefits include: quick response to operational needs; elimination or reduction of research and development costs; application of state-of-the-art technology to current requirements; and reduction of technology, cost, and schedule risks. Challenges NDI acquisitions present include the possibilities of items developed for other than DOD needs not meeting all requirements and mission performance trade-offs being required to gain advantages from pursuing NDI alternatives. Other challenges include providing logistics support, product modifications and continued product availability. Decisions governing operational requirements trade-offs require user reviews and approval.[7]

The NDI acquisitions benefit the systems acquisition process in reducing risk and development costs. These benefits may be offset by performance trade-offs.[8] The user will definitely benefit with the prompt availability of an item and savings from reduced risk and development cost. The user may benefit from these savings even though there may be a marginal increase in performance possible from a full developmental program.[9]

Background and History of NDI

The opinion that DOD should consider purchasing nondevelopmental items when a product meets user-need is not a new concept. Since the early 1970s, studies support using NDIs and urged DOD to increase using such products. However, these recommendations had little effect on increasing the use of NDIs.

In 1972, the Commission on Government Procurement "concluded the Government should take greater advantage of the efficiencies of the commercial marketplace."[10] This commission's report identifies the need for a "shift in the fundamental policy relative to commercial product procurement and for the establishment of a continuous oversight function to review agency policies and procedures."[11] The force behind this shift was the tremendous "cost of developing products to meet detailed or unique government specifications and of duplicating existing commercial distribution systems. This new philosophy envisioned greater reliance on privately developed, off-the-shelf products and using established commercial distribution channels to support these products."[12] Unfortunately, this is an issue we continue to struggle with today, 20 years later!

Congress established the Office of Federal Procurement Policy (OFPP) in 1974 to provide overall policy direction for federal procurement. In 1976, the Commission on Government Procurement's recommendations became policy when the OFPP issued the first in a series of memoranda governing procurement of commercial and off-the-shelf products. These memoranda stated the government should use commercial distribu-

tion channels in supplying commercial products to its users. The OFPP issued a memorandum in May 1976 to DOD, General Services Administration (GSA), and the Veterans Administration (VA), "establishing the Government's policy of encouraging the acquisition and distribution of commercial products."[13] The OFPP memorandum dated May 24, 1976, stated "the Government will purchase commercial off-the-shelf products when such products will adequately serve the Government's requirements, provided such products have an established commercial market acceptability. The Government will utilize commercial distribution channels in supplying commercial products to its users."[14]

The DOD undertook efforts to implement the commercial products policy in 1976, 1977 and 1978. Some included the Commercial Commodity Program, the Commercial Item Support Program, a specifications review effort and the Acquisition and Distribution of Commercial Products (ADCOP) program.

Commercial Commodity Program
The DOD announced the establishment of the Commercial Commodity Program in a memorandum to the military services dated December 30, 1975. This program was designed to increase the amount of goods purchased off-the-shelf by DOD. In August 1976, DOD established the Commercial Commodity Acquisition Program (CCAP), a pilot study conducted between 1977 and 1979. The objective was "to ensure that due consideration is given to the procurement and utilization of commercial commodities in those instances where these commodities will meet the requirements profile stipulated for intended application."[15]

This program anticipated payoffs in the areas of "lower life-cycle cost, increased reliability as a result of not consistently pushing the state of the art, achievement of a relatively high degree of standardization while avoiding built-in obsolescence, reductions in manpower and facility support requirements, improvement in the industrial base, and improved competition allowing us to avoid the 'sole-source box' into which we so often maneuver ourselves!"[16]

Commercial Item Support Program
In November 1977, DOD established the Commercial Item Support Program (CISP) to examine the worth of commercial products in the military arena on another level. Instead of acquisition, the program aim was to find if commercial distribution channels could cost effectively supply products to the military services.

ADCOP Program (1978-83)
Based on the CCAP pilot program experience, DOD concluded that purchasing commercial products increased competition, generally provided more favorable prices, provided equal or better quality products, reduced delivery times and did not adversely affect small businesses. In 1978, DOD issued Directive 5000.37 on the Acquisition and Distribution of Commercial Products (ADCOP).

This directive established the policy that DOD components were to "purchase commercial, off-the-shelf products when such products will adequately serve the Government's requirement, provided such products have an established commercial market acceptability, and use commercial distribution channels in supplying commercial products to users when it is economically advantageous to do so and the impact on military readiness is acceptable."[17]

Designed to unite previous DOD commercial buying efforts, the ADCOP program objectives were intended to emphasize the acquisition of commercial products to meet DOD

requirements, eliminate unnecessary government specifications, tailor essential specifications to reflect commercial buying practices and minimize administrative burdens of the government acquisition procedures.

According to the American Bar Association's *Contracting for Commercial Products and Services*, DOD's efforts were frustrated in two ways. First, Directive 5000.37 did not have the force of law. The Comptroller General either construed these requirements loosely or ignored them altogether in bid protests brought by excluded bidders.

Second, the requirement met with considerable opposition from companies (mostly small businesses) whose sales were exclusively or primarily to the Federal Government. At congressional hearings during 1980-82, these small businesses expressed fear that the "commerciality" requirements embodied in the ADCOP program might preclude them from competing for DOD contracts.[18]

General Accounting Office (GAO) Reports

Despite these programs, DOD's efforts to purchase NDIs were widely recognized as falling short of their potential. Between 1977 and 1980, the GAO issued at least two reports criticizing the inadequate use by DOD and other agencies of NDIs.[19] One report written by GAO in November 1977 was *"Government Specifications for Commercial Products — Necessary or a Wasted Effort?"* The GAO determined that "many Government specifications were outdated, too complex, and too costly to develop and maintain, and these deficiencies eliminated to a large extent the primary advantages attributable to specifications-standardization and competitive procurement."

The GAO January 1980 report was titled *"Implementation of Federal Policy on Acquiring and Distributing Commercial Products is Faltering Badly."* It concluded that DOD "implementation of the OFPP policy on commercial, off-the-shelf products is fragmented, and the Department's Defense Logistics Agency continues to purchase, stock, and distribute low-demand-value products; and its policies, procedure, practices, and methods are biased against the commercial products policy."[20]

Specification Refinement

The ADCOP Program assigned tasks relating to specification refinement. Its aim was to avoid detailed design specifications and convert them to functional specifications. As a result of work in this area of specification refinement, the Deputy Under Secretary of Defense issued a memorandum entitled "Implementation of Acquisition and Distribution of Commercial Products (ADCOP) Policies."

This policy established the use of Commercial Item Descriptions (CIDs) as the preferred way to acquire commercial items. The CID is a simplified functional performance characteristic that induces procurement of commercial items. In March 1982, President Ronald Reagan signed Executive Order 12352, Federal Procurement Reforms, to revitalize the inspiration for increased acquisition of commercial products. This order directed executive agencies to:

> Establish criteria for enhancing effective competition and limiting noncompetitive actions. These criteria shall seek to improve competition by such actions as eliminating unnecessary Government specifications and simplifying those that must be retained, expanding the purchase of available commercial goods and services, and, where practicable, using functionally-oriented specifications or otherwise describing Government needs so as to permit greater latitude for private sector response.

In 1983, DOD proposed to revise and streamline regulations and contract clauses to be used in commercial contracts. These proposed revisions to the then Defense Acquisition Regulations (DAR) would have made it much easier for DOD to purchase commercial products by simplifying commercial contracts. However, the proposed revisions appeared in the *Federal Contracts Report*, but were never issued.[21]

In 1984, as outlined in the report, *DOD's Inadequate Use of Off-the-Shelf Items*, the President's *Private Sector Survey on Cost Control* again focused on increased use of commercial products and simplified specifications to slash procurement costs. The report concluded the government commercial products program's successful start did "not appear to have continued at the pace of 1980-81."

Commercial Product Promotion

With the advent of the Competition in Contracting Act of 1984, Public Law No. 98-369 was enacted. This law stated that federal agencies should promote the use of commercial products whenever practicable. The establishment of CICA "marked the first statutory expression of the Government's interest in purchasing commercial products."[22]

A few months later, Congress reiterated the applicability of this policy to defense procurement in the Defense Procurement Reform Act of 1984 by stating "The Secretary should...direct that standard or commercial parts be used whenever such use is technically acceptable and cost effective."[23]

The President's Blue Ribbon Commission on Defense Management (the Packard Commission)

President Reagan established the Blue Ribbon Commission on Defense Management in July 1985. The purpose was to study issues surrounding defense management and organization and report findings with recommendations. The 1986 report of the Packard Commission brought renewed attention to the 1972 and 1984 policies.

One recommendation concerns expanding the use of commercial products "rather than relying on excessively rigid military specifications."[24] This suggests DOD "should make greater use of components, systems, and services available off-the-shelf. It should develop new or custom-made items only when it has been established that those readily available are clearly inadequate to meet military requirements."[25] Products developed strictly for military use and to military specifications generally cost more than commercial counterparts.

At the time of this 1986 report, the commission recommended the Defense Acquisition Executive (DAE) take a lead to assure an increase in using commercial products rather than those developed to military specifications. Further, the DAE should require program managers to "receive a waiver before using a product made to military specifications, if there is an available commercial counterpart. When a 'make-or-buy' decision must be made, the presumption should be to buy."[26]

In addition, the commission recommends the "DOD Supplement to the Federal Acquisition Regulation be changed to encourage streamlining military specifications themselves. Applying full military specifications, far from being ideal, can be wasteful."[27]

The DOD Authorization Act for FY 87, Section 907, "Preference for NDIs," addressed Packard Commission recommendations. As addressed in the National Security Industrial Association's *Army C3I Subcommittee on Commercial Off-The-Shelf/Nondevelopmental Items Study (COTS/NDI)*, this authorization act re-

quired DOD to state requirements to be performed in terms of functions to be performed and essential physical characteristics so those requirements might be fulfilled through purchase of NDI.

Besides defining NDI, it directed the Secretary of Defense to identify and remove impediments to NDI acquisition and provide a report to the Armed Services Committee of actions taken. The report, submitted in December 1987 and evaluated by the GAO in February 1989, was the subject of hearings before the Senate Government Affairs Subcommittee on Oversight of Government Management in May and June 1989.

Also, in 1989, the COTS/NDI study stated that the Secretary of Defense issued the report of the *Defense Management Review* as directed by the President. It recommended two legislative proposals: first, the Commercial Products Act of 1989 authorized procurement of such products under simplified competitive procedures; and, second, a Commercial Acquisition Pilot Program Act established to demonstrate advantages of adopting a full range of commercial-style buying practices.

In January 1989, Senator Carl M. Levin directed the subcommittee staff to investigate DOD's progress in implementing Section 907. During the next several months, the staff interviewed contractor representatives who said little progress had been made to remove impediments to purchasing NDIs by the DOD. Many gave specific examples of specifications, regulations, and contract clauses which made it difficult for contractors to do business with the government.

These witnesses at the subcommittee's May 16, 1989, hearings identified four significant impediments to the acquisition of NDIs: (1) inappropriate product descriptions and specifications, (2) unnecessary and burdensome contract terms and conditions, (3) inappropriate requests for certified cost or pricing data, and (4) unnecessarily burdensome quality assurance requirements.[28]

In June 1989, *National Security Review 11 on Defense Management* acknowledged the findings of previous studies and recommended actions to increase using NDIs in meeting DOD requirements. This review identified areas where practices could be improved to encourage greater uses of NDIs, including simplifying the contracting process and eliminating practices inhibiting NDI acquisition. In the technical requirements area, the review identified the need to improve communication with the user to establish requirements and state requirements in performance terms.

As a result of hearings before the Senate Government Affairs Subcommittee on Oversight of Government Management, the DOD Authorization Act for FY 90 and FY 91 included additional NDI legislation: Section 824, "Acquisition of Commercial and NDIs." The DOD was directed to develop a simplified uniform contract and establish an NDI training program. In November 1990, the National Defense Authorization Act for FY 91 included Section 810, "Acquisition of Commercial Products," which directed DOD to adopt streamlined procedures for acquiring NDI and to conduct market research before developing contract specifications in order to determine whether there were existing NDIs that would satisfy DOD needs. The accompanying conference report finally concluded that initial implementation of these reforms should be completed before more new legislation is enacted.

To date, there has been no effective directive specifying the ways and means to apply commercial technology and practices to military applications.

The CECOM Pamphlet 70-6 (September 1990), *Research, Development, and Acquisition — NDI Acquisition Guide*, describes policy, procedures, and responsibilities for applying NDI to CECOM programs. The SD-2 NDI handbook (October 1990) was written as a guide for acquisition managers and functional personnel who are, or will be, involved in NDI acquisitions. It provides guidance for increasing the use of NDI across the entire spectrum of acquisitions, yet it does not stipulate step-by-step procedures for acquiring NDIs. It describes tools and techniques for increasing the use of NDIs and avoiding common pitfalls.

In spite of these types of publications, NDI opportunities are generally not acted upon in the manner envisioned by the Congress or the Packard Commission. The prevailing tendency is to follow the routine of a developmental process.[29]

Title 10, U.S. Code: Armed Forces 2325, Preference for Nondevelopmental Items (September 1990) states the following:

> "The Secretary of Defense shall ensure that, to the maximum extent practicable-
> (1) requirements of the DOD with respect to a procurement of supplies are stated in terms of:
> a. functions to be performed;
> b. performance required; or
> c. essential physical characteristics;
> (2) such requirements are defined so that NDIs may be procured to fulfill such requirements;
> (3) such requirements are fulfilled through the procurement of NDIs;
> (4) prior to developing new specifications, the Department conducts market research to determine whether NDIs are available or could be mod fied to meet agency needs."[30]

Nondevelopmental Item Acquisition Act

This bill was first introduced in 1989 and reintroduced in 1991, but has never been signed into law. If it is, it will provide for the efficient and cost-effective acquisition of NDIs for federal agencies. The purposes of the NDI Acquisition Act are to:

(1) Establish a preference for the use of performance specifications and acquisition of nondevelopmental items by federal agencies;
(2) Require training of appropriate personnel in the acquisition of nondevelopmental items;
(3) Require federal agencies to designate personnel responsible for promoting the acquisition of nondevelopmental items and challenging barriers to the acquisition of nondevelopmental items; and
(4) Reduce impediments to the acquisition of NDIs by federal agencies.

DOD Directive 5000.1 and DOD Instruction 5000.2

The DOD Directive 5000.1, *Defense Acquisition*, requires DOD components to make "maximum practical use of off-the-shelf commercial products." In addition, DOD Instruction 5000.2, *Defense Acquisition Management Policies and Procedures*, states that materiel requirements shall be satisfied to the maximum practicable extent through the use of nondevelopmental items when such products will meet the user's need and be cost-effective over the entire life cycle.

This guidance should give motivation to the modification of other procurement regulations and will result in the adoption of procedures more consistent with commercial practice.[31] Thus far, however, this has not happened to an adequate degree.

CONCLUSION

Clearly, today's world environment is forcing a change in the way the Defense Department conducts acquisition business. The increased use of NDI acquisition strategies to satisfy new defense requirements has been an area of congressional and DOD emphasis for several years. Today, with the realities of the Nation's budgetary pressures, this concept must be embraced on a greater basis. The NDI acquisition concept has been defined, its increased use legislated, and its implementation documented. There is room for greater and more efficient implementation of the concept, however; and the following chapters will describe key areas and barriers affecting the NDI process.

ENDNOTES
Chapter 1

1. Cheney speech.

2. "Preference for NDIs," provision of the FY 87 *Defense Authorization Act*.

3. National Security Industrial Association - Army C3I Subcommittee, *Commercial Off-the-Shelf/Non-Developmental Item Study* (COTS/NDI), September 1991, p. 9.

4. OASD (P&L), SD-2, *Buying NDI*, October 1990.

5. *COTS/NDI*, p. 10.

6. *SD-2, Buying NDI*, October 1990.

7. *Ibid.*

8. *Ibid.*

9. *Ibid.*

10. American Bar Association, *Contracting for Commercial Products and Services*, September 1989, p. ix.

11. *Report of the Commission on Government Procurement*, Vol. 3, Part D, "Acquisition of Commercial Products," December 1972.

12. SD-2, *Buying NDI*, October 1990.

13. Memo from Hugh E. Witt, administrator, OFPP, "Procurement and Supply of Commercial Products," 24 May 76.

14. *DOD's Inadequate Use of Off-The-Shelf-Items*, October 1989, p. 3.

15. *Ibid.* p. 4

16. *Ibid.*

17. *Ibid.*

Endnotes
Chapter 1 (continued)

18. American Bar Association, *Contracting for Commercial Products and Services*, p. 3.

19. *DOD's Inadequate Use of Off-The-Shelf-Items*, October 1989, pp. 3-4.

20. *Ibid*, p. 4

21. *Ibid*, p. 5

22. American Bar Association, *Contracting for Commercial Products and Services*, p. 4.

23. Public Law No. 98-525 S.1202, 98 Stat. 2588, 2588-89 (1984).

24. *A Quest for Excellence*, Final Report to the President by the President's Blue Ribbon Commission on Defense Management, June 1986, p. 60.

25. *Ibid.*

26. *Ibid*, p. 61.

27. *Ibid*, p. 61.

28. *DOD's Inadequate Use of Off-The-Shelf-Items*, p . 6.

29. *COTS/NDI*, p. 7.

30. *NDI Acquisition Act of 1990*, September 10, 1990.

31. *Defense 92*, March/April 1992.

" I'd like to have an operator in Gerry Cann's shop... helping him put the operational spin on acquisition." [1]
—Vice Admiral Richard Dunleavy
Assistant Chief of Naval Operations for Air Warfare

Chapter 2

REQUIREMENTS GENERATION IN AN NDI ACQUISITION

The generation of military requirements to satisfy a national security threat or change in the existing force structure is a dynamic situation in which the acquisition process must function. The relationship between user and acquisition agency in an NDI acquisition must be cooperative to succeed. This chapter addresses the user and acquisition agency relationship in NDI acquisition. The functional relationship of these two organizations in the formulation and implementation of military requirements is one of the impediments to successfully using NDI in DOD acquisitions. This relationship drives the use of market analysis as an important step in acquiring NDI systems or components. This chapter also concentrates on using the market survey in the NDI acquisition process.

REQUIREMENTS GENERATION PROCESS

The President's Blue Ribbon Commission on Defense Management, April 1986, (Packard Commission) stated "all of our analysis leads us unequivocally to the conclusion that the defense acquisition system has basic problems that must be corrected. These problems are deeply entrenched and have developed over several decades from an increasingly bureaucratic and overregulated process. As a result, all too many of our weapon systems cost too much, take too long to develop, and by the time they are fielded, incorporate obsolete technology." The Commission further stated "problems with the present defense acquisition system begin with the establishment of approved 'military requirements' for a new weapon, a step that occurs before development starts."

The most fundamental concept of NDI acquisition is that it must meet user needs and function in the users' environment. The NDI acquisition solutions must represent the most cost-effective approach to meeting users' requirements. Simply stated, an NDI acquisition should meet user requirements at the lowest life-cycle costs.[2] This concept has been further embodied in DOD Instruction 5000.2 by providing specific policy requiring the maximum use of NDI when such items can meet user requirements in a cost-effective manner across the life cycle of the system.

The issue of developing military requirements was recognized earlier by the Packard Commission. In its report to the President, the Commission specifically recommended:

> Rather than relying on excessively rigid military specification, the Department of Defense (DOD) should make greater use of components, systems, and services

available 'off-the-shelf.' It should develop new and custom made items only when it has been established that those readily available are clearly inadequate to meet military requirements.

The NDI Preference Act of 1987 further required the Department of Defense to state requirements for supplies in terms of functions to be performed, performance required, and essential physical characteristics: "defining requirements so that NDI can be procured to fulfill them."[3]

The traditional approach to the requirements process, regulations, and the "mind-sets" has been toward developmental items. This approach is a cultural-based and a regulatory-based inhibitor of DoD propensity to favor guidance for new development efforts while providing relatively little guidance for procurement of existing items. It is tradition to believe that one's requirements are unique and that there is nothing available to fulfill user needs.

The Air Force Joint Command, Commercial Off-The-Shelf (COTS) Supportability Working Group (CSWG) conducted a study of the requirements process for commercial items in 1989 and 1990. The working group observations of the Air Force acquisition process concerning COTS were reported in June 1991. Findings of the working group in regard to requirements generation, however, are pertinent to all Services. In its report, the working group found "current regulations covering the requirements process require that non-developmental items (NDI) — both commercial and governmental — be considered before development of a new item is initiated to meet a specified need. In practice, however, two types of problems often occur."

The problems identified by the Air Force COTS Supportability Working Group were:

First, initial requirements documents are developed without careful consideration of what is currently available as NDI. This can happen when the operational community develops the requirements document focusing only on the operational needs independent of 'solutions' to these needs. Once these documents are developed, it is difficult for the user to 'back off' from validated requirements and accept an available NDI solution which does not meet all of the stated requirements. Modified NDI or no use of NDI often is the result.

A second type of problem occurs when the user develops a requirements document based on available commercial technology rather than available commercial products. Under this approach, several desired functions or capabilities which might exist in several different commercial products are combined into a single requirements document. Yet, no existing commercial item can provide all of the functions or capabilities without modification.

In a developmental program, this can often be accommodated because the item has not been designed. If the item is under design or design has been completed, the Service can usually make changes to the item to meet the Service specifications and requirements.

Changes to an item in a developmental program may cause minimal adverse effects because the Service controls the design, data rights, and configuration control. Minimal effects historically result in increased costs and lengthened program schedules. In commercial acquisitions, the item is designed and built to the demands of the commercial marketplace. The Services have some influ-

> ence but no control of the design, data rights, or configuration control. Thus, demands of the Service to modify a commercial item to meet specifications or requirements create a unique item from the commercial marketplace. This unique item then is more costly to operate and support during the life cycle.[4]

The problems with the defense acquisition system, and particularly with NDI acquisitions, begin with the establishment of approved "military requirements" for a new system to meet the changing threat or international environment. Previously, two common methods for establishing the need for a new system were "user pull" or "technology push." Both methods were stated as being unsatisfactory by the Packard Commission.[5]

User pull is the process by which the Services assess the adequacy of the existing military systems to meet the needs or changing threat, and state the characteristics of the next weapon system in terms of overcoming the identified inadequacies of the existing systems. This process, in general, does not involve participants with knowledge of the cost and schedule implications of technical improvements required to satisfy these characteristics. As a result user pull often leads to gold plating by the Services.

On the other hand, requirements often are developed by technology push. Numerous military systems, some good and some less than successful, have been developed as a result of government- or industry-conceived new or advanced technology. Such technology has then been marketed to the users who have been pushed to state their requirements in a manner which will exploit the new technology. Like user pull, this method of requirements generation also tends to be gold plated as the participants tend to push technology for its own sake.

REQUIREMENTS AND TRADE-OFFS

The NDI acquisition thus presents unique challenges to the acquisition agency and user. Most prominent of these challenges is formation of a working relationship between the user and the acquisition agency. The NDI acquisition process requires considerable interaction between the acquisition agency and user throughout the acquisition process. To facilitate such an interactive role, on the part of both parties, it is essential that a change in the mind-set be implemented.

The acquisition agency must enter into this cooperative partner relationship during the requirements generation process. The acquisition agency, as the organization responsible for selecting, procuring, fielding, and sustaining the system, must bring to the relationship the knowledge of the cost, schedule, and technical risks associated with the acquisition process. The user, as representative of the Service forces and the party responsible for the requirements, brings to the relationship the knowledge of how the weapon system will be employed by the Services. The user must ensure that requirements documents are not overly restrictive and contain only essential user requirements.

The ultimate goal of this cooperative partner relationship is the approved requirements documents that satisfy both the user's requirements and provide sufficient flexibility for the acquisition agency to conduct solicitation of the NDIs to satisfy those requirements.[6]

The relationship between the acquisition agency and the user is fundamental to the ultimate success of a program. This trusting relationship provides both agencies with the necessary information to make informed trade-offs between the user's requirements and the acquisition agency's program cost and schedule constraints. A delicate balance

is required in formulating weapon system requirements allowing for advances in military capability but avoiding gold plating by either organization. A constructive acquisition agency and user relationship realizes that, generally, the users do not have sufficient technical knowledge and program experience; and the developer does not bring to the relationship the experience or insight regarding operational problems. Therefore, to strike the critical balance necessary for the NDI acquisition program to succeed, a diverse blend of backgrounds and perspectives must be achieved and trade-offs must be accepted by both organizations.[7]

Flexibility in operational requirements is an important consideration in the effective use of NDI in system acquisitions. This flexibility must be pursued by both organizations through cooperation, coordination and communication. The developer must be responsive to legitimate needs of the user; but the acquisition agency must be fully conscious of the technical risks, affordability constraints and schedule impacts. The users must be realistic in stating their requirements and considering viable trade-offs. After weighing the proven capability and more rapid deployment benefits of the intended system against any performance limitations, the user must determine, with the acquisition agency, whether the trade-offs are acceptable.[8]

MARKET ANALYSIS AS A TOOL IN NDI ACQUISITION

The NDI acquisitions, more than any other acquisition, require trade-offs between desired system performance, cost and schedule, and between one performance parameter and another. These trade-offs should be made to optimize satisfaction of the user's requirements and should ensure that critical and essential user requirements or thresholds are met. In determining NDI acquisition viability, NDI systems or components should be assessed not only on the basis of performance but in the context of total system life-cycle effectiveness parameters as well.

Effective implementation of NDI acquisitions, therefore, requires a substantial change in the mind-set, procedures and practices of the existing acquisition system. The acquisition agency and user must be willing to investigate potential viable sources to meet the user's requirements at a more reasonable price, even if performance trade-offs are required. The intensive use of market analysis is one means of ensuring success in this front-end process.

REQUIREMENTS AND MARKET ANALYSIS LINK

The Office of the Assistant Secretary of Defense (Production and Logistics) has developed the Defense Standardization Program Market Analysis for Nondevelopmental Items (SD-5) to assist in the process of market analysis. In SD-5, the statutory requirements for market analysis of an acquisition program are stated as follows: "The 1991 DOD Authorization Act amended 10 U.S.C. Sec. 2325(a) to require that DOD conduct 'market research' before developing a new specification. Prior to that amendment, the Federal Acquisition Regulation (FAR) 11.004 required that the Government conduct 'market research and analysis' to ascertain the availability of commercial products to meet the identified need."

The acquisition agency must provide the user with accurate market analysis data. With this data the user can evaluate the effectiveness and suitability of the NDI or refine the requirements of the desired system or component. The market analysis should be a two-phase process: market surveillance and market investigation.

Market surveillance is defined as the ongoing process of the acquisition agency to canvass

the technology and product developments in its areas of expertise. While market surveillance is not seeking to fulfill a specific need, it is essential to maintain a viable technology basis. A good market surveillance involves subscribing to trade journals, reading manufacturer catalogs and new product announcements, attending industrial shows and conferences, as well as reviewing unsolicited proposals. The depth of the market surveillance is dependent upon the complexity of the component or area of expertise.[9] A necessary change in the acquisition process, particularly in using NDIs, is that the market surveillance be an ongoing function and not dependent on a request for information to support a user's needs.

This area of market analysis will become increasingly important as the military infrastructure is downsized and the military-industrial complex is restructured. Rapidly changing technology today requires the acquisition agency to stay in touch with developments in the commercial industry and be aware of existing systems or components from other governmental sources. This is essential for providing data on suitable NDI to the user. A good market surveillance will place acquisition personnel in a position to participate in developing the requirements, with users knowing availability of NDI components or systems capable of fulfilling their needs. In many cases the market surveillance, if conducted properly, may be sufficient to determine the adequacy of an NDI system or component; and no additional investigation is necessary.[10]

While market surveillance is general and ongoing, market investigation has a more narrow focus. Market investigations are conducted in response to a defined need and focus on specific solutions to provide recommendations to the user. The market investigation is not aimed at selecting sources to compete for the contract. Its purpose is to determine, with a high degree of confidence, what technology or products can satisfy user needs. The extent of the market investigation is dependent on complexity of the system or component, dollar value and number of the items to be procured.[11]

Market investigations are a means of exploiting the technology maturity to reduce cost of the system or to increase performance sought by the requirements. The Packard Commission stated that DOD should place greater emphasis on using technology to reduce program and life-cycle costs by reducing unit acquisition cost and improving reliability, operability, and maintainability of equipment procured. A weapon system should be predicated on state-of-the-art technology only when benefits of new technology offset concomitant risks. This principle is difficult to apply if reliable information to make trade-offs of risks and benefits is not made available to the user.[12]

For NDI acquisitions, the acquisition agency must provide users with accurate market investigation data to allow them to evaluate effectiveness and suitability of the NDI system or component or to refine material requirements. The user then must conduct an integrative process, in cooperation with the acquisition agency, of comparing requirements to the products available. From this comparison, the user may accept trade-offs allowing the use of NDIs in the system or component acquisition. The goal of this interactive and integrative requirements review process by both organizations should be approved requirements documents that will satisfy the user's requirements and allow the acquisition agency the flexibility to use NDIs to satisfy those requirements. After the decision to use NDI to satisfy user requirements, the strategy of the acquisition agency must be formulated to work closely with the user dur-

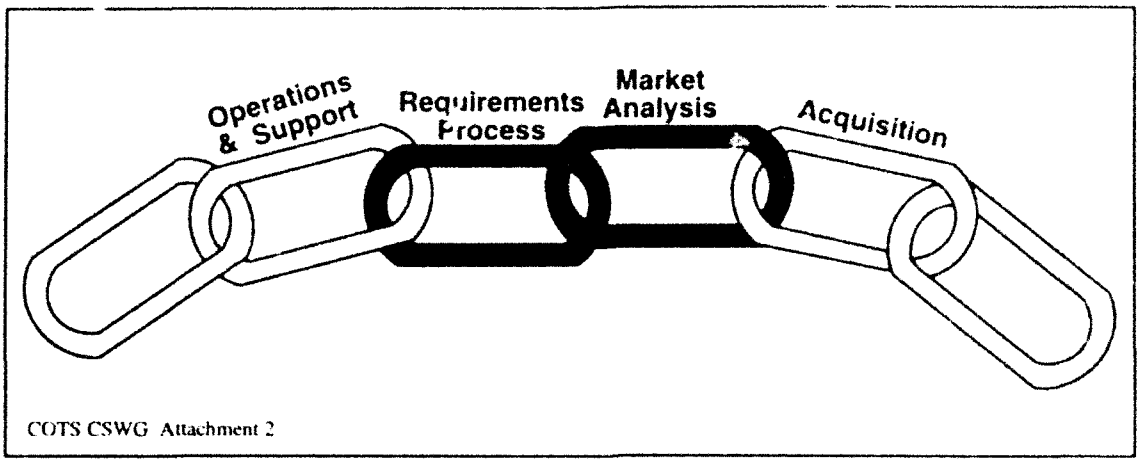

Figure 1. **Requirements and Market Analysis Link**

ing the acquisition process to ensure the NDI continues to satisfy user needs until the system or component is delivered.

CONCLUSION

The acquisition of NDI systems and components is not a new concept. It is a concept whose implementation is being slowed by cultural, bureaucratic, and even economic issues (mind-sets).[13] The acquisition of NDI systems and components does represent an alternative process for acquiring DOD systems and components. While the traditional bureaucratic process was adequate in determining whether a proposed development program would meet the stated user requirements, it lacks a viable mechanism for challenging those requirements. The traditional thought process that the military requirements and subsequent system acquisition are unique must be challenged at all levels of the acquisition process. Due to the current "mind-set," DOD forfeits many valid opportunities for adopting existing systems, both from commercial and other governmental sources, that could improve the military capability more quickly and at a reduced cost.[14]

Education of the acquisition agency is required in the extended use of the market analysis. Today's rapidly changing technology outside the military organizations may hold the future to continued high standards and technological supremacy demonstrated by U.S. forces. The expanded use of market analysis, ongoing surveillance and in-depth investigations to evaluate suitability of NDI systems and components before initial user requirements formulation and milestone reviews will be central to the success of NDI acquisitions.[15] The tradition of the market analysis being conducted to support acquisition of the item or system and not in support of the requirements generation process must be changed. The result of this traditional method is that the requirements generation process is not linked to market realities. (Figure 1)

The user must be educated in effectively evaluating the market analysis information. The user must not be afraid to accept tradeoffs of the requirements. The user's knowledge of the iterative review process for evaluating the market capabilities and realities will aid in determining cost-effective solutions in today's shrinking budget. By using up-to-date market information on current technology maturity and developed products, it is possible for users to match their requirements with market availability and to make knowledgeable assessments of whether their

requirements should be reshaped to accept what is available from an NDI acquisition or whether there is justification for a developmental program.[16]

The key to the success of the NDI acquisition process lies in the mind-set of DOD. The traditional bureaucratic mind-set cannot be allowed to exist in today's procurement environment. The current processes, regulations, and requirements documentation does not recognize the viable use of NDIs from commercial or other governmental sources. The declining defense budget will dictate that DOD must do things differently. Therefore, the new mind-set must recognize the unique characteristics of an effective NDI process to: (1) meet user requirements; (2) continually refine and tailor user requirements to prevent gold plating; and (3) open advanced technology doors that were closed to DOD in the past, while keeping pace with changing threats, evolving technology, products, and progress.

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"The problem is the culture still believes that commercial can't be as good as military." [1]

—Mr. Nicholas Torelli
Deputy Assistant Secretary of Defense
for Production Resources

Chapter 3

SPECIFICATIONS AND STANDARDS IN AN NDI ACQUISITION

Military specifications (MILSPECS) and military standards (MILSTDS) now number approximately 30,000 documents.[2] These military specifications and standards have traditionally been viewed as the foundation for today's superior military equipment. Thirty to forty years ago, these MILSPECS and MILSTDS were a necessary part of military acquisitions. However, in today's high-tech environment, the continued requirement to stipulate MILSPECS and MILSTDS in DOD procurement is a severe impediment to the use of NDI systems or components. This chapter focuses on government use of these unique military specifications vs. system descriptions in terms of functional, performance and physical characteristics, and the use of military and nonmilitary specifications and standards in the NDI acquisition process. Principles of the "dual use" technology and the effect that MILSPECS and MILSTDS have on the government procurement process and commercial industry will also be addressed.

SPECIFICATIONS IN DOD ACQUISITION

As stated by the Honorable Larry J. Hopkins, Ranking Minority Member, Investigations Subcommittee, before the U.S. House of Representatives Committee on Armed Services:

> After 3 years we are still trying to push a reluctant military bureaucracy toward compliance...When we ask for something they give us two reasons why they won't or can't do it. The record is that merely stating policy objectives is not enough. What is needed is a step by step blueprint which leaves as little room as possible for self serving mischief by the services or other organizations whose major instinct is to frustrate reform and continue business as usual.[3]

There is a widespread belief, a culture, a "mind-set," among many defense planners and technologists that military and civilian technologies are inherently different. Military weapon systems must often push the outside envelope of performance. They must often be built to endure the harsh battlefield environments, and the weapon systems are expected to survive several decades of use for training missions to sustain a high degree of readiness. These superior performance requirements have driven the military to believe that the majority of, if not all, military equipment

is unique. This belief has created a bureaucratic culture and mind-set based on this supposed uniqueness. It is this misplaced belief, therefore, that has driven the stipulation of military specifications in solicitations to ensure the performance of products. Critics of the belief that military equipment is singularly unique can see the divergence occurring between military and commercial technologies. The uniqueness of military equipment and products is often the result of the Services' fixation on achieving technical levels of performance that may or may not be decisive in warfare.

Currently, the military has placed itself in a position where it is less able to acquire, in a timely manner and at a reasonable cost, the leading-edge technology that exists. Such leading-edge technology may be available in the civilian sector, but is often beyond the reach of the Department of Defense because of DOD bureaucratic regulations, processes and mind-set. Critics of the "uniqueness position" believe that commercial products can be as rugged as those built to military specifications and standards.[4] In Desert Storm, many civilian technological components, from semiconductors to global positioning systems, met or exceeded their military counterparts' performance at a significantly lower price and were able to be delivered on schedule to support the deployment of U.S. forces in the Persian Gulf.[5]

The Packard Commission recognized the potential that commercial products could afford the DOD acquisition process. In its report the commission stated that:

> Rather than relying on excessively rigid military specifications, DOD should make greater use of components, systems, and services available 'off-the-shelf.' It should develop new or custom-made items only when it has established that those readily available are clearly inadequate to meet military requirements.

The Commission further stated in regard to military specifications that:

> Products developed uniquely for military use and to military specifications generally cost substantially more than their commercial counterparts. DOD program managers accordingly should make maximum use of commercial products and devices in their programs.

Since the report of the Packard Commission, the awareness of DOD that products made to government specifications are more costly for the government to acquire than a similar product in the commercial sector has increased. Recent legislation, including amendments to 10 USC 2325, "Preference for Nondevelopmental Items," and DOD acquisition reform initiatives have prompted the use of more functional-type specifications.

However, government description of these functional- and performance-type specifications are still generally more detailed and specific in a products' characteristics than the product descriptions used in the commercial world.

Military specifications and standards have been frequently criticized by industry for being excessively demanding. Even when the desired performance of an item to be procured is comparable to that of an available commercial-sector component, the military specifications and standards stipulated by the government acquisition communities often require a different item to be developed. These differences between military specifications and commercial functional descriptions

thus preclude using a viable commercial component in a defense system.

In some cases, military uniqueness (nuclear weapons, submarine safety systems, etc.) warrants using the strict military specifications and standards which are distinct from commercial specifications and functional descriptions. A higher level of performance or system criticality may require these strict specifications; but, generally, military specifications go beyond performance requirements by describing the manufacturing process, even down to the type of solder and flux to be used.

It is these process specifications and standards that isolate military systems from the available state-of-the-art commercial technology.[6] Industry believes acquisition agencies should concentrate on defining what equipment is required to do rather than writing complex military unique specifications which are often outdated by the time the documents are approved.[7]

The mind-set of DOD bureaucracy is that of having to deal in the past with the worst suppliers. The mind-set of mistrust and the requirement for extreme oversight on the part of the acquisition agency was the result. Therefore, military specifications and standards have been written during the years to include a level of detail that is unnecessary in dealing with today's high-quality, world-class suppliers. The DOD must learn to use specification types that describe the item to be procured in terms of the form, fit and functional performance vs. the traditional "how to" military specification type that impedes the quality defense suppliers from using the technology and manufacturing processes of world-class suppliers. The continued requirement to specify the "how to" for defense industries will continue to suppress innovation, manufacturing progress and technological transfer from the commercial sector to DOD.[8]

SPECIFICATIONS IN NDI ACQUISITIONS

The use of NDI systems and components as solutions for the procurement of DOD materials and equipment has been brought forth to reduce acquisition costs and durations. The NDI is said to have provided significant benefits such as:

- Faster materiel responses to operational needs
- Elimination or reduction of research and development (R&D) efforts
- Abbreviated testing and evaluation
- Reduced production start-up costs
- Application of commercial innovations
- Opportunity to take advantage of economies of scale- and high-quality products developed for commercial markets, other Services or foreign military forces
- Reduction in technical, cost, and schedule risks.[9]

The DoD Instruction 5000.2 provides specific policy requiring maximum use of nondevelopmental items when they can meet user needs in a cost-effective manner during the life cycle of the system or component. Additionally, DoD Directive 5000.1 directs that "maximum practicable use shall be made of non-government standards and commercial item descriptions." [10]

It is current DOD policy that the selection of standards and specifications used in the design and acquisition process give preference to commercial practices and nongovernmental standards. Recent changes to MIL-STD-970, "Order of Preference for the Selection of Standards and Specifications," reflect this policy change and should force the acquisition agency to address component or system per-

formance. The MIL-STD-970 requires the following order of precedence for specifications and standards: nongovernmental standards, commercial item descriptions (CIDs), governmental specifications stated in terms of functional requirements, and detailed government specifications (MILSPECS/MILSTDS).[11] To comply with this policy, the acquisition agency must describe the item to be procured, not in terms of a technical or military specification, but in terms of a performance characteristic desired by the user.

The DOD acquisition system traditionally has been designed to buy DOD-unique items. In today's budget environment, the Services will not enjoy the freedom to procure items in the traditional manner. Selection of military specifications and standards must be tailored to ensure the optimum use of technology available. Direction has been given to DOD to use NDI systems or components in military weapon systems.

Specific guidance in the Federal Acquisition Regulation (FAR), Part 10, Section 10.002(b) states "Acquisition policies and procedures shall require descriptions of agency requirements, whenever practical, to be stated in terms of functions to be performed or performance required." The FAR further states, in Part 10, Section 10.006(b) "...agencies should consider stating their needs in a purchase description, when appropriate under Part 11 and implementing regulations, even though there is an indexed specification."

Additionally, the DOD FAR Supplement (DFARS), Part 210, Section 210.002 states "Requirements that are not mandatory by law or established DOD policy and that do not contribute to the operational effectiveness and suitability of the system, or effective management of its acquisition, operation, or support shall be excluded...During all acquisition phases, solicitations and contracts shall state management requirements in terms of results needed rather than 'how-to-manage' procedures for achieving those results."[12]

The emphasized use of NDI systems or components in military equipment represents a significant departure in the way DOD conducts acquisitions. Lack of trust between the acquisition communities and defense industries must be addressed to make NDI acquisition successful. The use of military specifications and standards is required to ensure a level of interoperability in systems and components made up of NDIs. However, those applicable MILSPECS and MILSTDS must be reviewed and tailored to ensure that the acquisition agency is not directing manufacturers on "how to" build the item desired but informing the manufacturer what the acquisition agency wants to buy. The net result of such reduced and tailored specifications is a reduction in procurement costs and faster delivery of high-quality products to the user.[13]

The acquisition agency must be aware that adhering to strict compliance of military specifications usually means defense industries incur a penalty for doing business with DOD. A study of this penalty resulting from the stipulation of MILSPECS is being performed by various aspects of industry for the American Defense Preparedness Association (ADPA). Until the study is completed and an exact figure is determined for the penalty associated with the stipulation of unique military specifications, the penalty has been estimated by the ADPA as a figure which is 40-percent higher than similar commercial program costs.[14]

The majority of the costs associated with the requirements to use the military specifications and manufacturing processes for military-unique equipment often result in separation of product manufacturing lines within the

same company, different and separate accounting systems and unnecessary use of additional facilities and employees. The use of NDI systems and components, therefore, could potentially provide a means of reducing these significant cost penalties associated with DOD acquisitions of full developmental programs.

DUAL-USE TECHNOLOGIES AND NDI ACQUISITION

The ability of DOD to retain the technological superiority of the military arsenal and equipment relies on the adoption of state-of-the-art commercial technology into current military systems and components. The use of NDI systems and components provide DOD with a bridge to reach the "high-tech" systems sought by the Services within a defense budget demanded by the Congress. Reduction of the defense budget and the resulting drawdown of the defense industry requires the acquisition agency to understand three critical trends which affect the high technology accessible to the military.

First, although civilian technology historically has tended to lag military technology, this is not the case today. Commercial products, particularly those in the computer, electronics and new materials industries, lead current defense technology. Additionally, these products have developed to a state where the environment in which they are deployed in the commercial sector is equivalent to, or harsher than, environments previously felt to be unique to the military.

Second, in the past, commercial products required extremely high-volume runs to achieve efficiency and quality obtained through mass production. This high-volume production was inconsistent with the smaller volume of defense products. In today's commercial sector, world-class producers who are forced to be competitive in the international market are moving to flexible manufacturing. Flexible manufacturing requires high efficiencies and quality be achieved with multiproduct, low-volume operations of similar production process and be built in the same plant.

Third, historically, the critical defense technologies were significantly different from those critical technologies of the commercial sector. Today, the list of critical technologies has a significant overlap. The list of critical technologies for the Department of Defense includes such items as advanced electronics, new materials, software, advanced manufacturing equipment, and advanced information systems. A list published by the Department of Commerce of the emerging critical technologies required for international competitiveness includes more than an 80-percent overlap with those items listed on the Department of Defense list of critical technologies.[15]

The three trends indicate that the only way the Department of Defense will be capable of maintaining the superior technology of the current military systems is to move toward a structure of acquisition in which there is a limited number of defense-unique sectors (such as nuclear weapons, tanks, and submarines) and a large sector of integrated civilian and military products. This mix of integrated products encompasses dual-use research to common performance requirements, plant integration of engineering, production, and support, and buying common ruggedized equipment at the subsystem and component level.[16]

The use of NDI system and component acquisition will allow DOD to access high-tech products currently available and, in the future, in the commercial sector. The mind-set of the acquisition agency must be changed to see military use of commercial components and systems as a viable means of accessing

state-of-the-art technology, rather than as a component not adequate to meet military-unique performance requirements or operating environment.

CONCLUSION

The impediment of military specifications and standards to the use of NDI is significant. The culture of that element of DOD whose sole purpose it is to generate the military specifications must be broken. The Congress and industry have been telling DOD that the traditional ways of conducting business are not economically beneficial nor do they support national security.

It is clearly understood that there always will be a military application of technology that never will find a demand in the commercial sector. Military uniqueness, in a limited form, always will be required of critical systems (i.e., nuclear weapons, tanks, and submarines). At the same time, it appears possible to substitute commercial products based on commercial performance specifications for MILSPEC items in even the most advanced military systems.

The use of commercial technology in the Persian Gulf War demonstrated that some commercial components can perform as well as, if not better than, the unique military component in the harsh military environment. It is also evident that commercial technology that could be important to advance the existing superior DOD military systems will be unavailable to DOD without a significant change in the culture and mind-set of DOD acquisition agencies.

Rejection of commercial products in favor of those traditionally "developed to strict military specification" must be deterred. The bureaucratic culture that believes in the uniqueness of military equipment continues to force DOD to pay a significant penalty, in time and dollars, for technology that is often available in the commercial sector. Procurement laws relating to the use of military specifications, which were written in a time of increasing defense budgets, have in the past created serious obstacles to the integration of commercial and defense products. The preference for commercial performance specifications vice military specifications and a "how-to" attitude has been established by DOD.

The acquisition agency must understand the result that such preference for unique military specifications costs programs.

The acquisition agency must vigorously pursue efforts to increase the use of commercial manufacturing process and product specifications, in lieu of unique "how to" military specifications. The use of NDI systems and components, selected by commercial performance description, allow the acquisition agency to draw upon the commercial state-of-the-art technology to ensure a continued force structure employed with the superior technology sought by the user and demanded by the Congress.

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" The Test Community Is Public Enemy #1."
—Anonymous O-6 Program Manager

Chapter 4
TEST AND EVALUATION

While we hope that all program managers in the acquisition force do not feel like the one quoted, there is evidence his feelings are not isolated. His statement was in response to a question for opinions on the greatest impediments to effective NDI acquisitions. While the above opinion reflects one extreme, there are unique test-and-evaluation aspects of an NDI acquisition program to be considered during planning and execution.

Before addressing these considerations we will describe the test-and-evaluation process in a standard developmental-type program. Focus will shift to how the basic process can be tailored to suit an NDI program. Finally, we will discuss specific test-and-evaluation challenges to the NDI process.

THE TEST AND EVALUATION PROCESS

The basic purposes of test and evaluation in the systems acquisition process, as stated in DODI 5000.2, are to:

(1) Provide essential information for assessment of acquisition risk and for decision-making,
(2) Verify attainment of technical performance specifications and objectives, and
(3) Verify that systems are operationally effective and suitable for intended use.[1]

Test is described as a program, procedure or process to obtain, verify or provide data to determine the degree a system (or subsystem) meets, exceeds or fails to meet stated objectives. It usually denotes actual testing of hardware or software models, prototypes, production equipment and computer programs to obtain desired information or data.[2] *Evaluation*, on the other hand, is the process whereby the data and information collected through testing, as well as other sources, is organized and analyzed for the purposes of performance verification and decision-making. Figure 2 highlights users of this test-and-evaluation information.

Test-and-evaluation activities occur throughout the acquisition life cycle and generally comprise three major categories: test planning, developmental test and evaluation (DT&E), and operational test and evaluation (OT&E). As Figure 3 shows, test planning, primarily in the form of Test and Evaluation Master Plan (TEMP) development and update, is present throughout the acquisition life cycle. Of the actual testing activities, DT&E is dominant in the earlier phases of the cycle while OT&E is dominant in later stages. While more heavily concentrated in opposite ends of the cycle, it is important to note that there is activity of both types throughout the cycle.

TEST PLANNING

The entire test planning process is focused around one major document, the Test and Evaluation Master Plan (TEMP). It is the ba-

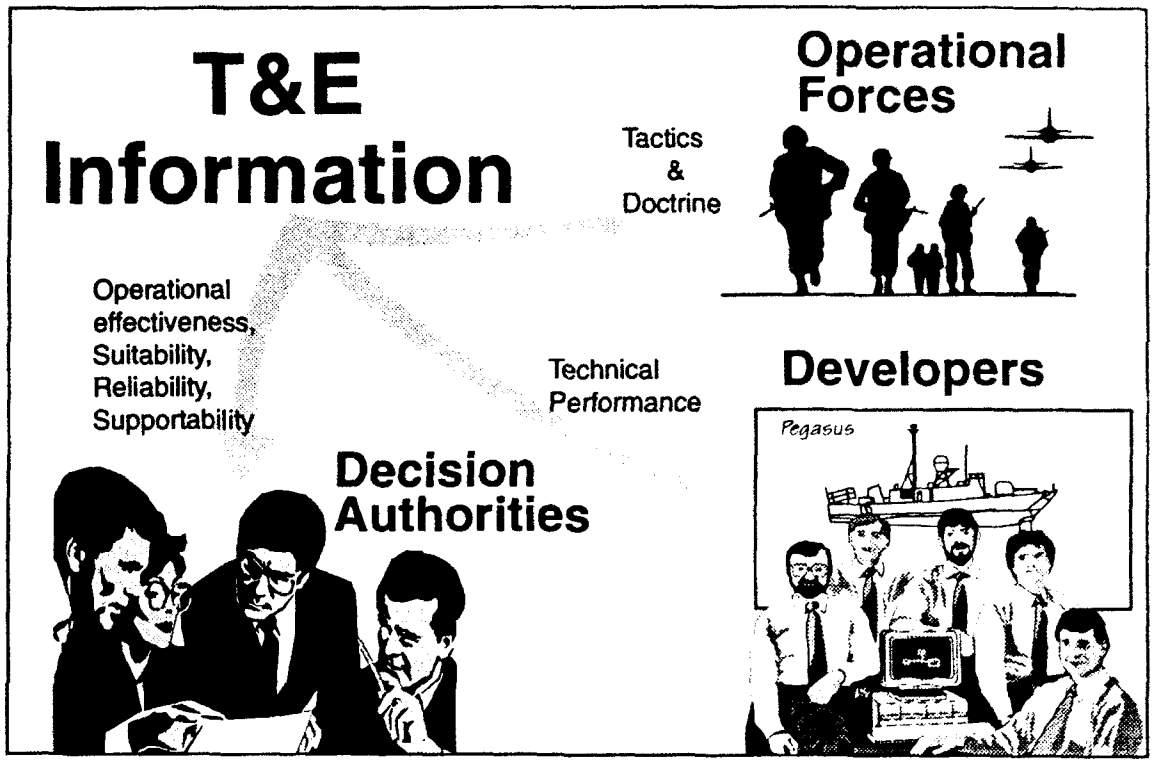


Figure 2. **Users of T&E Information**

sic summary document describing the test program, is developed early in the acquisition program and updated annually or at each milestone. The TEMP is the responsibility of the program management office; however, it is developed in cooperation with the applicable independent operational test agency for the specific program.

As stated earlier, the TEMP is a summary document which describes the DT&E and OT&E approaches, defines management responsibilities for test phases, identifies and relates test and evaluation (T&E) schedules/resources to critical issues, minimum acceptable operational performance requirements, evaluation criteria and milestone decisions, and addresses T&E for all acquisition phases. Figure 4 presents a graphical presentation of the key elements contained in the TEMP.

DEVELOPMENTAL TEST AND EVALUATION

Developmental test and evaluation has several specific goals. They include:

(1) Identifying potential operational and technical limitations of alternative concepts and design options,
(2) Supporting identification of cost-performance trade-offs,
(3) Supporting the identification and description of design risks,
(4) Substantiating that contract technical performance and manufacturing process requirements have been achieved, and
(5) Supporting the decision to certify the system ready for operational test and evaluation.[3]

These goals are met through several forms of DT&E during the acquisition cycle. Contrac-

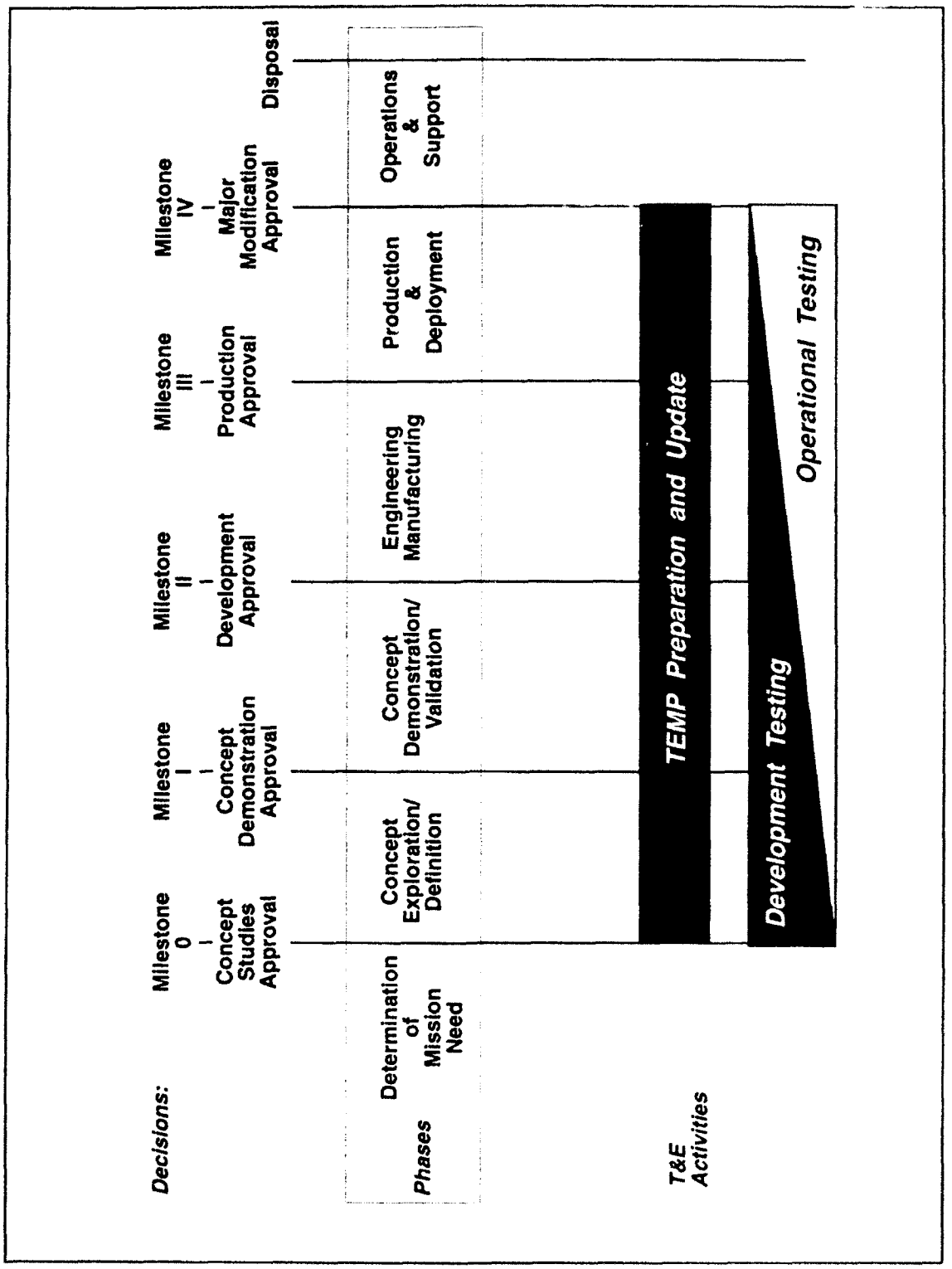


Figure 3. The Defense System Lifecycle

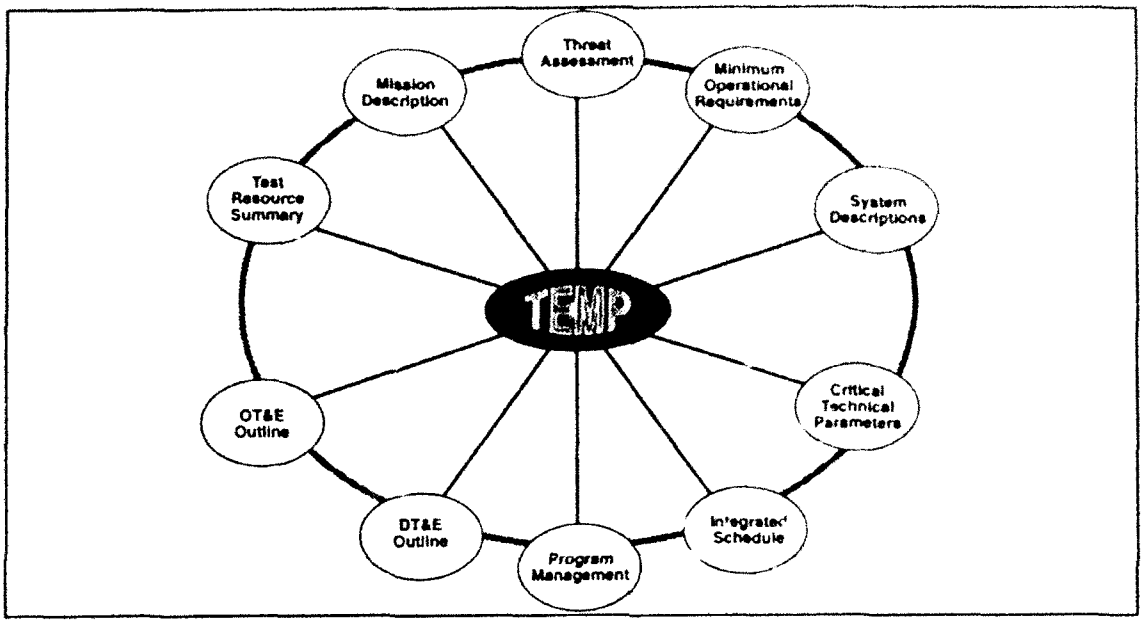


Figure 4. **Key Elements of TEMP**

tor system development is an iterative process of design, build, test, identify deficiencies, fix, retest and repeat. System life, design evaluation/verification, design limits, reliability development and availability/ maintainability testing are examples of contractor-type testing. Component, subsystem and, finally, total system performance and specification compliance are the focus of these tests.

Often, these contractor tests are monitored by the government; or, the government actually participates in the testing. Production-oriented DT&E includes production qualification testing (PQT) and production acceptance testing (PAT). The PQT is conducted on production hardware and is intended to verify the integrity of the manufacturing process.[4] Finally, production acceptance testing, done on production items just prior to delivery, ensures contract requirements and specifications are being met by the production article and that its performance is the same as preproduction models extensively tested during DT&E.

OPERATIONAL TEST AND EVALUATION

Operational test-and-evaluation programs are to determine operational effectiveness and suitability of a system. *Operational Effectiveness* is defined as the degree of overall mission accomplishment of a system when used by representative personnel in the environment planned or expected for operational employment of the system considering organization, doctrine, tactics, survivability, vulnerability, and threat (including countermeasures, nuclear, and chemical and/or biological threats).[5]

Operational Suitability is the degree to which a system can be placed satisfactorily in field-use with consideration given to availability, compatibility, transportability, interoperability, reliability, wartime usage rates, maintainability, safety, human factors, manpower supportability, logistics supportability, documentation, and training requirements.[6] Figure 5 lists contrasts between DT&E and OT&E programs.

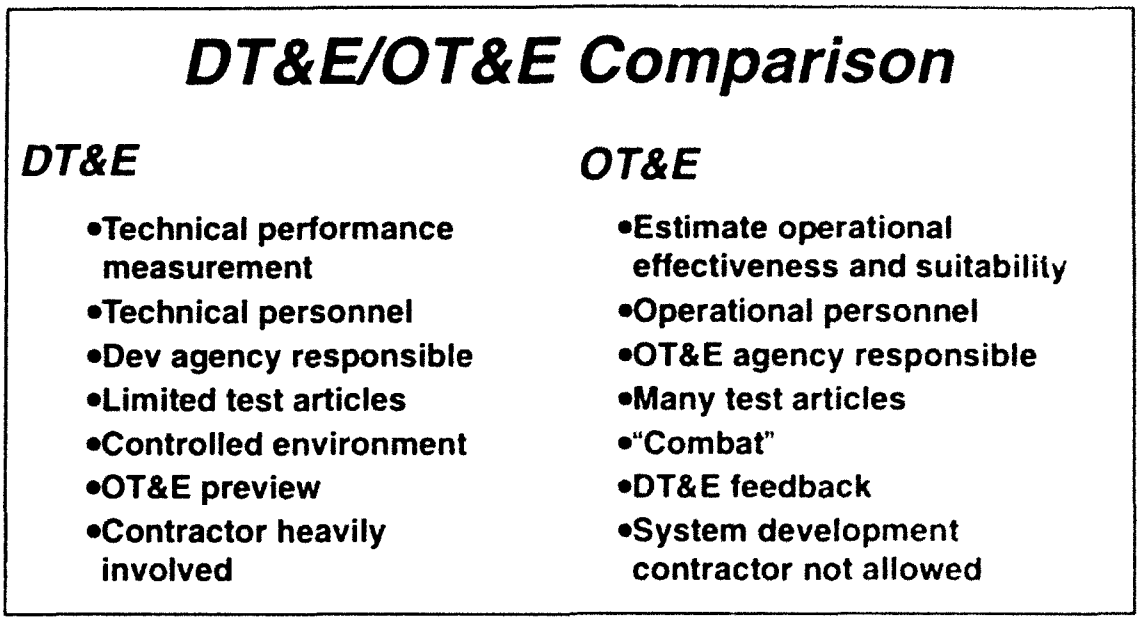


Figure 5. **Comparing DT&E/OT&E**

There are several main products and periods in an OT&E program. Two activities performed by the OT&E community early in the development cycle are formulation of Early Operational Assessments (EOA) and operational assessments (OA). An operational assessment is described as:

> ...an evaluation of operational effectiveness and suitability made by an independent operational test agency (OTA), with user support as required, on other than production systems. The focus of an OA is on significant trends noted in the development efforts, programmatic voids, areas of risk, adequacy of requirements, and the ability of the program to adequately support OT&E. OA may be made at any time using technology demonstrations, prototypes, mockups, engineering development models, or simulations. OA will not however substitute for the independent IOT&E necessary to support full production decisions.[7]

An EOA is simply an OA conducted before, or in support of, Milestone II. Initial Operational Test and Evaluation (IOT&E) is the final dedicated phase of OT&E preceding a full-rate production decision. The IOT&E phase is one of the final examinations that entails dedicated operational testing of production representative test articles using typical operational personnel in as realistic a scenario as possible. The IOT&E phase is conducted by an OTA independent of the contractor, program management office, or developing agency. Results from this test are evaluated and presented to the decision authority before the decision to enter full-rate production Milestone (MS) III.[8] In terms of documentation, the Director, Operational Test and Evaluation, is required to submit a "Beyond Low-Rate Initial Production Report" to the Congress for Acquisition Category (ACAT) I or other designated programs before the subject programs may proceed to full-rate production.[9]

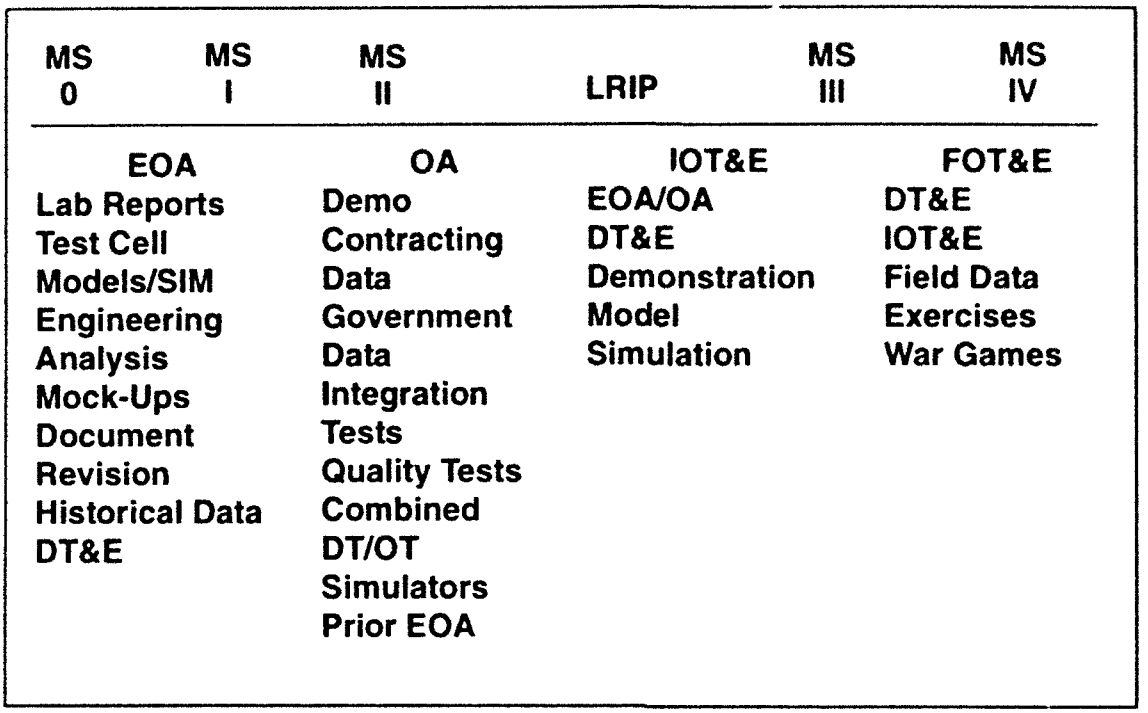


Figure 6. **Sources of Data**

Follow-on operational test and evaluation (FOT&E) is conducted after the Milestone III decision. Tests are conducted in a realistic operational environment similar to prior OT&Es, but a greater number of test items may be used. In addition, actual production systems are used in FOT&E. Specific objectives of FOT&E include testing of modifications that are to be incorporated into production systems, completion of any deferred or incomplete IOT&E, and assessment of operational availability including spares support. These tests also are used to test the system in a new platform application, new tactical applications, or against new threats.[10] Figure 6 depicts sources of evaluation data used for the EOAs, OAs, IOT&E and FOT&E.

Qualification operational testing and evaluation (QOT&E) may be performed by the major command, user or operational test agency and is conducted on minor modifications or new applications of existing equipment when no research and development funding (e.g., an NDI program) is required. The basis of the QOT&E program, like other OT&E, is to evaluate operational effectiveness and suitability of the modified system or existing system in its new mission or operating environment.

LIVE-FIRE TESTING

Often discussed separately, live-fire testing is another category of testing which is a subset of DT&E and frequently is found in major systems and certain other programs. Required by Title 10, United States Code, Section 2366, live-fire testing is dictated for certain major systems, called covered systems, designed to provide protection to a user in combat or for major munitions or missile programs. The purpose of live-fire testing is to attain realistic assessments of weapon platform/crew vulnerabilities to damage/injury

that could be inflicted by the conventional munitions most likely to threaten the system in combat. In addition, it is meant to assess conventional munitions/missile lethality against combat targets. The final product of live-fire testing is the "Live-Fire Test Report," which is delivered to the Congress before a full-rate production decision.

TEST AND EVALUATION IN THE NDI PROCESS

Now that the normal test and evaluation process for a typical developmental acquisition has been described, let's look at how that process can be tailored to support an NDI acquisition. The extent of a test-and-evaluation program for an NDI acquisition depends on factors like the type of NDI, similarity of intended use and environment to current use, degree of current use of the proposed system, and amount and quality of test data available from the original system development. With these factors in mind, let's address a suggested basis for an NDI test and evaluation program.

First, the T&E program must fulfill one of its basic tenants, risk definition. The program must contain enough testing to define risk in terms of how the system meets the functional specification in the intended operational environment. The program must adequately define the system's operational effectiveness and suitability. With risk definition in hand, the T&E program must meet legal requirements, like required mandatory testing and reporting requirements for milestone decisions. Finally, a proposed program should maximize advantages of an NDI approach. Time-and-cost savings that are basic to an NDI approach cannot be tested away because of the T&E community's zeal for testing and risk elimination. The T&E community must look at the basis of a T&E program as risk management, not risk elimination. In addressing test and evaluation for an NDI, we will follow the acquisition through its life cycle and address T&E at each stage.

MARKET INVESTIGATION

The T&E, especially the evaluation portion, must be a part of the market investigation. Developers, users and independent testers should play parts in this early, but very important, test-and-evaluation activity. Developers should take the lead, but user-and operational-testers must be able to provide their requirements and operating environment insights. Remembering that the market investigation is accomplished to determine availability and feasibility of an NDI solution, any testing conducted during that phase should be very limited and serve only that purpose. It should not compare different systems against each other; it should verify availability and feasibility. Evaluation should be based predominantly on available data gathered by:

(1) Obtaining manufacturer test results,
(2) *Observing manufacturer testing at his facility,*
(3) Obtaining usage and failure data from other customers or service user,
(4) Obtaining test results from independent test organizations (e.g., Underwriter's Laboratory).[11]

Results of the required testing, available data gathering, and subsequent evaluation will be used in direct support of the NDI strategy decision. If a positive decision is made, the market investigation T&E results can be used further to refine system requirements based on available technology/capabilities and to assist in solicitation preparation. While these market investigation T&E requirements/guidelines are delineated clearly in DOD Handbook SD-2 and other Service guidance, there has been evidence that it doesn't always happen. A 1991 U.S. Army Audit Agency report states: "Independent evalua-

tors weren't adequately involved in planning market investigations or in reviewing the investigation results for 20 projects."[12]

The same report continues that, in 32 of 39 projects reviewed, previous test or performance data was not obtained and independently evaluated to determine if the system met Army requirements or if further Army technical or user testing was required.[13] Of course, this may be the fault of the test community, developing agency, or a higher-level agency if NDI strategy was directed/legislated, regardless of what the test-and-evaluation results might show.

TESTING BY NDI TYPE

Assuming that a market investigation and analysis recommends using an NDI solution, the remaining test-and-evaluation requirements must be determined and documented in the TEMP. Once again, developers, users and independent operational testers must participate as members of the Test Integration Working Group (TIWG) to tailor test requirements and execution strategy. Specific tests required vary, of course, with each individual acquisition, however, SD-2, "Buying NDI," has general guidelines for T&E versus NDI type being acquired. These guidelines are summarized here:

- The NDI intended to be used in the same environment for which it was designed: No development testing is required prior to production qualification test except when the contract is awarded to a contractor who has not previously produced an acceptable finished product, and the item is assessed as moderate-to-high-risk. In that case, some preproduction testing should be accomplished. Operational testing is required when an organic maintenance environment is a development or unknown feature.
- The NDI intended to be used in an environment different from that for which it was designed: Early qualification testing will probably be required in the operational and maintenance environment. Preproduction qualification testing will be required if early qualification testing leads to modification of the original item. Production qualification testing will be required.
- The NDI intended for integration into a larger system: Feasibility testing to qualify a test sample should be done prior to selection and integration into the system. Preproduction testing of the complete system is required. Hardware and software integration testing will be necessary.

CHALLENGES TO NDI TEST AND EVALUATION

Risks. The test-and-evaluation community recognizes four major areas of risk concerning the testing of NDI systems. The first is that requirements may not be clearly understood. Without clearly defined and understood requirements, it is extremely difficult to ensure that the right capabilities and aspects of a system are being tested and evaluated. In addition, a system may be wrongly qualified or disqualified. Finally, without clear delineation of requirements, the user may not get what he needs, wants or expects.

The second area of risk is defining the operational environment. If the operational environment and forecast usage of a system is not clearly defined, it will be impossible for the T&E community to test or evaluate to a comfortable level of confidence. Several years ago the U.S. Air Force (USAF) contracted for a fleet of C-21 operational support aircraft. The C-21 is an NDI Lear-35 business jet. The USAF forecast operating environments and usages for the C-21s similar to what the Lear-35 encounters in civil aviation. After introduction into the inventory, the C-21 began to encounter failures in certain landing-gear

components well before the forecast service life which was based on flying hours. When investigated, the problem was attributed to the fact that the Air Force, due to training philosophies, accumulated a significantly higher number of landings per flying hour than did civil aviation.

Thus, when the aircraft entered service, it reached the service life of landing-gear components quicker than it had forecast in terms of flight hours. The service life should have been based on the number of landings. The basic fault was that, while the operating environment (the civil aviation airspace structure) was the same, the intended usage was not defined accurately. Had it been, data for landing-gear service life could have been evaluated in terms of landings instead of flight hours; and the forecast for landing-gear failure or preventative maintenance could have been calculated more accurately.

The third area of risk is associated with the clear definition of system interfaces and interoperability between the NDI system and others with which it must interface or operate. Again, this relates back to defining requirements clearly and accurately. Because an NDI system may have to operate with a system or within a system that it was not concurrently developed with, the interfaces and interoperability issues can either falsely disqualify or qualify the NDI system.

The final area of risk is that documentation and support issues may not be covered sufficiently in the NDI test program, thus allowing the Service to commit to a system that may not be operationally suitable or supportable without more development or supportability work being accomplished. This is often not a showstopper in the long-term of a system's deployment, but can slow down or stall initial fielding and utilization.

Impediments. In addition to risks associated with an NDI program, there are impediments to efficient development and execution of an NDI test and evaluation program.

The first impediment is basic to many aspects of an NDI program—mind-set. In testing, like all traditional functional areas, the community has been oriented toward traditional developmental approaches to test and evaluation. It is often difficult to reorient testers' thinking to a nontraditional NDI approach. This nontraditional approach may include less testing, more reliance on data someone else collected and other exclusions that make testers naturally nervous. If this mind-set cannot be broken, many cost-and-saving benefits may be given up through unnecessary or inappropriate testing.

The second impediment feeds the mind-set problem—lack of knowledge or experience with commercial test practices and standards. If the test community doesn't understand how commercial or other product developers tested their systems or doesn't have complete understanding and confidence in standards tested, they naturally will want to repeat tests in the traditional military manner and to familiar standards.

The Air Force has dealt with this impediment in commercial- type aircraft purchases. It has created an organization within the 4950th Test Wing, Wright-Patterson Air Force Base, that is the Air Force Center of Expertise (COE) for testing commercial aircraft for military applications. This organization is staffed with Air Force test pilots, engineers and management who have developed an experience and knowledge base in Federal Aviation Administration (FAA) and Civil Aeronautics Board aircraft development, testing and operating standards. They have developed and conducted test programs for many Air Force NDI acquisitions which used commercial or mili-

tary aircraft sources from domestic and foreign aircraft manufacturers. They have an NDI mind-set versus a developmental mind-set and, as a result, are effective in implementing NDI test programs. In addition, their knowledge and experience with commercial and foreign military test standards and practices give them the ability to analyze more effectively the available contractor test and usage data. The programs they have been involved with vary from the highly visible new Air Force One, a commercial Boeing 747 variant, to small three-to-four aircraft programs like the C-22, a Boeing 727.

In addition to working commercial applications, this group has participated in test programs in which foreign military aircraft are being acquired to meet USAF needs. An example is the C-27 aircraft procured for use by the USAF in Panama. It is an Italian-made G-222 aircraft, currently in use by the Italian Air Force, with minor mission-related modifications to support USAF requirements. The group is also currently working with the Joint Primary Aircraft Training System (JPATS) program as the responsible test organization. This Air Force/Navy program will procure nondevelopmental aircraft in large numbers for use by both Services as primary trainers.

CONCLUSION

Test and evaluation is an integral part of the acquisition process with the primary purpose of identifying and reducing risk within the program. In an NDI program, depending on previous usage of the item in question, a T&E program can be significantly tailored, thus contributing to time-and-cost savings associated with an NDI strategy. There are risks and impediments associated with a tailored NDI test-and-evaluation program which must be considered and mitigated where possible. The bottom line always should be that the T&E program effectively provides data and analysis to determine whether or not the NDI system is operationally effective and suitable for the intended environment.

ENDNOTES
Chapter 4

1. DODI 5000.2, p. 8-2.
2. DSMC *Test and Evaluation Management Guide*, p. 4-1.
3. DODI 5000.2, p. 8-4.
4. AFR 80-14, p. 3.
5. DSMC *Test and Evaluation Management Guide*, p. 3-5.
6. AFR 80-14, p. 3.
7. DSMC Test and Evaluation Course Material.
8. DSMC *Test and Evaluation Management Guide*, p. 9-4.
9. DODI 5000.2, pp. 8-9.
10. DSMC *Test and Evaluation Management Guide*, p. 9-4.
11. OASD (P&L), NDI Program, SD-2, *Buying NDI*, (October 1990), p. 7-4.
12. NE91-204, p. 6.
13. *Ibid.*

" But when the only tool in your tool kit is a hammer, every problem starts to look like a nail."
—Kenneth L. Adelman
—Norman R. Augustine

Chapter 5
INTEGRATED LOGISTICS SUPPORT IN AN NDI ACQUISITION

This chapter addresses integrated logistics support (ILS) in an NDI acquisition environment. For focus, ILS is defined as are the ten ILS elements. The challenge, relative to ILS in an NDI acquisition, is discussed and is followed by a look at specific ILS considerations during the NDI acquisition process. Several elements of ILS and issues related to them are examined.

ILS DEFINITION AND THE TEN ILS ELEMENTS

Integrated logistics support is defined as "a disciplined, unified, and iterative approach to the management and technical activities necessary to integrate support considerations into system and equipment design; develop support requirements that are related consistently to readiness objectives, to design, and to each other; acquire the required support; and provide the required support during the operational phase at minimum cost."[1] There are ten elements of ILS, defined as follows:

Maintenance Planning: The process conducted to evolve and establish maintenance concepts and requirements for the lifetime of a materiel system.

Manpower and Personnel: The identification and acquisition of military and civilian personnel with the skills and grades required to operate and support a materiel system over its lifetime at peacetime and wartime rates.

Supply Support: All management actions, procedures, and techniques used to determine requirements to acquire, catalog, receive, store, transfer, issue and dispose of secondary items. This includes provisioning for initial support as well as replenishment supply support.

Support Equipment: All equipment (mobile or fixed) required to support the operation and maintenance of a materiel system. This includes associated multiuse end items, ground-hauling and maintenance equipment, tools, metrology and calibration equipment, test equipment, and automatic test equipment. It includes the acquisition of logistics support for the support and test equipment itself.

Technical Data: Recorded information regardless of form or character (such as manuals or drawings) of a scientific or technical nature. Computer programs and related software are not technical data; documentation of computer programs and related software are. Also excluded are financial data or other information related to contract administration.

Training and Training Support: The processes, procedures, techniques, training devices, and equipment used to train civilian and active duty and reserve military personnel to operate and support a materiel system. This includes individual and crew training; new equipment training; initial, formal and on-the-job training; and logistic support planning for training equipment and training device acquisitions and installations.

Computer Resources Support: The facilities, hardware, software, documentation, manpower and personnel needed to operate and support embedded computer systems.

Facilities: The permanent, or semipermanent, or temporary real property assets required to support the materiel system, including conducting studies to define types of facilities or facility improvements, location, space needs, utilities, environmental requirements, real estate requirements, and equipment.

Packaging, Handling, Storage and Transportation: The resources, processes, procedures, design considerations and methods to ensure that all system, equipment, and support items are preserved, packaged, handled and transported properly, including environmental considerations, equipment preservation requirements for short- and long-term storage, and transportability.

Design Interface: The relationship of logistics-related design parameters, such as reliability and maintainability, to readiness and support resource requirements. These logistics-related design parameters are expressed in operational terms rather than inherent values and specifically related to system readiness objectives and support costs of the materiel system.

THE ILS CHALLENGE IN NDI ACQUISITION

Effective ILS poses a challenge in developmental programs, even with all the training and guidance that acquisition personnel receive. Ensuring that ILS is handled effectively in an NDI acquisition can be a significantly more difficult challenge to materiel acquisition personnel because of the differences in an NDI acquisition process. Since the acquisition lead time is reduced, there is less time available to plan for and develop organic support. Those ILS activities that normally would occur during the demonstration and validation and the engineering and manufacturing development phases must be accelerated to ensure effective support for that item. However, unlike a developmental item, with NDI there may be support in place, as well as "real" reliability data and training. These items are being used, broken and fixed. Additionally, logistics support may be impacted adversely by proliferation of hardware and software since DOD may not be acquiring sufficient technical data and technical-data rights to maintain configuration control of commercial items. Also, influence DOD has with the supplier may be limited by its customer status.

The problems involved with ILS in an NDI acquisition can be overcome, just as they can be

overcome in a developmental-item acquisition. Acquisition personnel must be sensitive to problems and ensure they are addressed early in the acquisition process. They must understand implementing effective ILS for NDI probably will require a departure from "normal" procedures of a developmental-item acquisition; and they must seriously consider trade-offs when deciding to adopt an NDI acquisition strategy. "The acquisition strategy must state whether organic, contractor, or a mix of organic/contractor logistic support is the most cost and operationally effective approach to support the item. Appropriate trade-off analyses should be conducted to arrive at the most cost and operationally effective support strategy. Interim contractor support, lifetime contractor logistic support, or full organic logistic support must be considered and planned for during the development of the acquisition strategy and definitized in NDI solicitation." [2] The departure from "normal" procedures or, rather, inability to depart from them, was highlighted in a 1991 National Security Industrial Association study "Commercial Off-the-Shelf/Non-Developmental Items (COTS/NDI) Study" as follows:

> It is evident that the logisticians...have reviewed and studied the NDI/COTS issue. Apparently because of their paradigms, the results continue to come out the same, namely, that the "standard" way of doing business should not change. Information received from that community leads to the conclusion that the only way to go is to buy maintenance and provisioning data and train Army military and civilians for maintenance support....
>
> What this bears out is that acquisition, fielding, and sustainment of COTS/NDI remains a serious problem for the U.S. Army. A major change in culture is necessary, and that cannot happen quickly. The current methods, procedures, and cults have been grown, cultivated, and taught since the end of World War II.[3]

The study explains the possible reason for this situation:

> Life cycle support, worldwide, is very important to the Army, as the Army can be required to deploy to any location in the world on short (hours) notice. It must be able to keep its equipment and systems operational so as to ensure successful mission accomplishment. The failure or loss of an item of equipment on a critical task could make a difference between mission success or failure. In full recognition of the [SIC] fact, it is easy to comprehend the emphasis placed on life cycle support. It is also easy to understand why military personnel and civil servants resist change in the methods of getting or planning life cycle support. Very few people are willing to take a chance to specify COTS/NDI items and contractor support because of the fear that the two will not meet military performance and support requirements.[4]

The study further states existing Army regulations reinforce the "business as usual" mind-set and there appears to be no differentiation between conventionally developed items and commercial off-the-shelf or nondevelopmental items. It concludes the discussion of life-cycle support by calling for a total paradigm shift through "an innovative environment that tolerates and promotes change by adding emphasis to the use of the existing commercial support system and pipeline for life cycle support of COTS items of equipment."[5] Additionally, support for all types of equipment must be "tailored" to each item whether it is developmental or nondevelop-

mental. Regulation, publications and training should be developed to support this "tailored" approach, with increasing dialogue between industry and Army acquisition personnel.

In June 1991, the Air Force Systems Command (AFSC) and the Air Force Logistics Command (AFLC) published a joint study called the "Joint Command Commercial Off-The-Shelf (COTS) Supportability Working Group (CSWG) Final Report." Not surprisingly, the CSWG found similar problems with supporting NDI in the Air Force. The following "support approach issues" were outlined in the Air Force report:

> Commercial items, specifically the internal configurations of commercial items, change with the market. The changes are driven by competitive pressures. The changing market allows the Air Force to benefit from item improvement but is also a major source of many of the supportability problems associated with commercial items. Over time, the support problems increase as spares, software, and the entire support base evolve with the changing item.
>
> Additionally, commercial item acquisition and deployment can be fast paced. Often the acquisition and deployment of commercial items outstrip the Air Force's ability to get support to the field on time and keep it current with the changing commercial configuration.
>
> Support for changing, fast paced commercial acquisitions is complicated by regulations and processes that are geared to developmental items and processes. The Air Force attempts to fit commercial acquisitions into the standard support processes for areas such as provisioning, technical orders, common support equipment, and engineering data.[6]

The CSWG study discusses acquisition strategy issues contributing to inadequate, up-front support planning; engineering approaches in system design and integration that impact supportability; requirements process issues; supply support issues; and "mind-set" issues. Some of these and CSWG recommendations are discussed later in the chapter.

ILS CONSIDERATIONS IN NDI ACQUISITION PROCESS

In response to increased NDI acquisition and recognizing potential problems associated with it, the Army included a chapter concerning NDI in AMC/TRADOC Pamphlet 70-2 (Chapter 17). The chapter provided guidance on ILS and other considerations during phases of an NDI acquisition. It provided NDI-related guidance in each element of ILS. With the subsequent publication of SD-2, "Buying NDI," by the Office of the Assistant Secretary of Defense for Production and Logistics (OASD (P&L)), and DODD 5000.1 and DODI 5000.2 (23 Feb '91), AMC/TRADOC Pamphlet 70-2 has been rewritten and will be republished as a Department of the Army (DA) pamphlet. The following paragraphs examine aspects of the NDI acquisition process as discussed in the previously mentioned documents and other studies and reports on the subject.

Market Investigation/Market Analysis. The previous chapter on requirements generation in an NDI acquisition discussed market analysis, surveillance and investigation. The following discussion will relate ILS considerations to those functions.

During market investigation conducted by the acquiring agency, logistics support requirements information should be provided

to industry. It should include planned maintenance echelons, maintainer proficiency levels, software maintenance plans, limitations on evacuation of reparables, maintenance environment, supply support, training needs and technical data needs. In their responses, industry should provide information on reliability history, maintainability features, flexibility for government maintenance (licensing), critical interfaces with other subsystems affecting supportability, maintenance in various environments/conditions, extent of competition for support, warranties, current military and commercial customers, estimated life-cycle costs, and requirements/source of logistics-related training.

The market investigation should provide sufficient information to allow supportability to be thoroughly considered in the subsequent trade-off process. However, it is critical in this stage of market analysis that the focus remain on which products are available on the commercial market instead of which technology is available. Failure to do this could result in available technologies from different products being consolidated into a single requirement, making utilization of the commercial support base impossible or, worse, making it impossible to fulfill the requirement all together. Despite the focus on available products, thorough examination of product supportability is required.

> Selecting an NDI solution to an acquisition does not imply that any elements of ILS can be ignored. The ILS elements of NDI candidates must be thoroughly assessed during the market investigation so that ILS remains a critical factor in the decision whether an NDI strategy is feasible. In arriving at a decision regarding ILS for an NDI, it should be kept in mind that the NDI alternatives may require a departure from traditional methods of acquiring logistics support. The early application of ILS requirements influences design in order to optimize system supportability. This is not necessarily the case for an NDI and it is important that the Government considers what has been accomplished in all the logistics elements of an NDI to assist in the NDI decision and identify areas requiring more effort.[7]

Coordination with "Test Community". Concurrent with the market investigation process, the Test and Evaluation Master Plan (TEMP) is being prepared by the program office in cooperation with the test community. It is important to ensure all critical logistics support-related requirements are identified so they can be included in subsequent testing. Potential sources of existing data relative to critical logistics support-related requirements should be identified. Then, these requirements must be coordinated between ILS personnel representing the user and program office and the testing community for inclusion in the TEMP.

Formulating Integrated Logistics Support Plan and Acquisition Strategy. At this point, an NDI acquisition strategy will be developed, if appropriate. To ensure ILS is incorporated effectively during the NDI acquisition process, a thorough and coordinated Integrated Logistics Support Plan (ILSP) should be developed in conjunction with developing acquisition strategy. The ILSP should consider all ILS elements including establishment of milestones for each element. With an NDI acquisition, thoroughness is critical in this stage since activities related to both Milestones I and II normally must occur during this phase. Planning for deployment and post-production support must be thorough. This is due to the accelerated nature of the program and problems involved with ILS lagging the availability of an NDI from the production line.

As one respondent said in an NDI survey, "It takes me 18-20 months to do a user and market survey and put on contract a piece of commercial equipment. From contract award, the vendor can usually deliver equipment within 3-6 months; it takes nearly 30 months to do all the logistics required for fielding. Logistics is, by far, the 'long pole in the tent.' TM's (Technical Manuals) and MAC (Maintenance Allocation Charts) are the longest, along with parts provisioning and stocking."

During the ILS planning process, trade-offs should be made of how the NDI will be utilized relative to other programmatic considerations. Decisions on how the NDI will be supported will result from this trade-off process. These decisions must include consideration for the fact that there may not be an "ideal" solution to support an NDI. Some aspects of NDI support will be less than optimal. It must be remembered that overall benefits of acquiring NDI may far exceed these specific logistics-related concerns. As long as the concerns are recognized and the ILSP is structured to optimize the risk they present, effective ILS can be achieved for the life of the NDI.

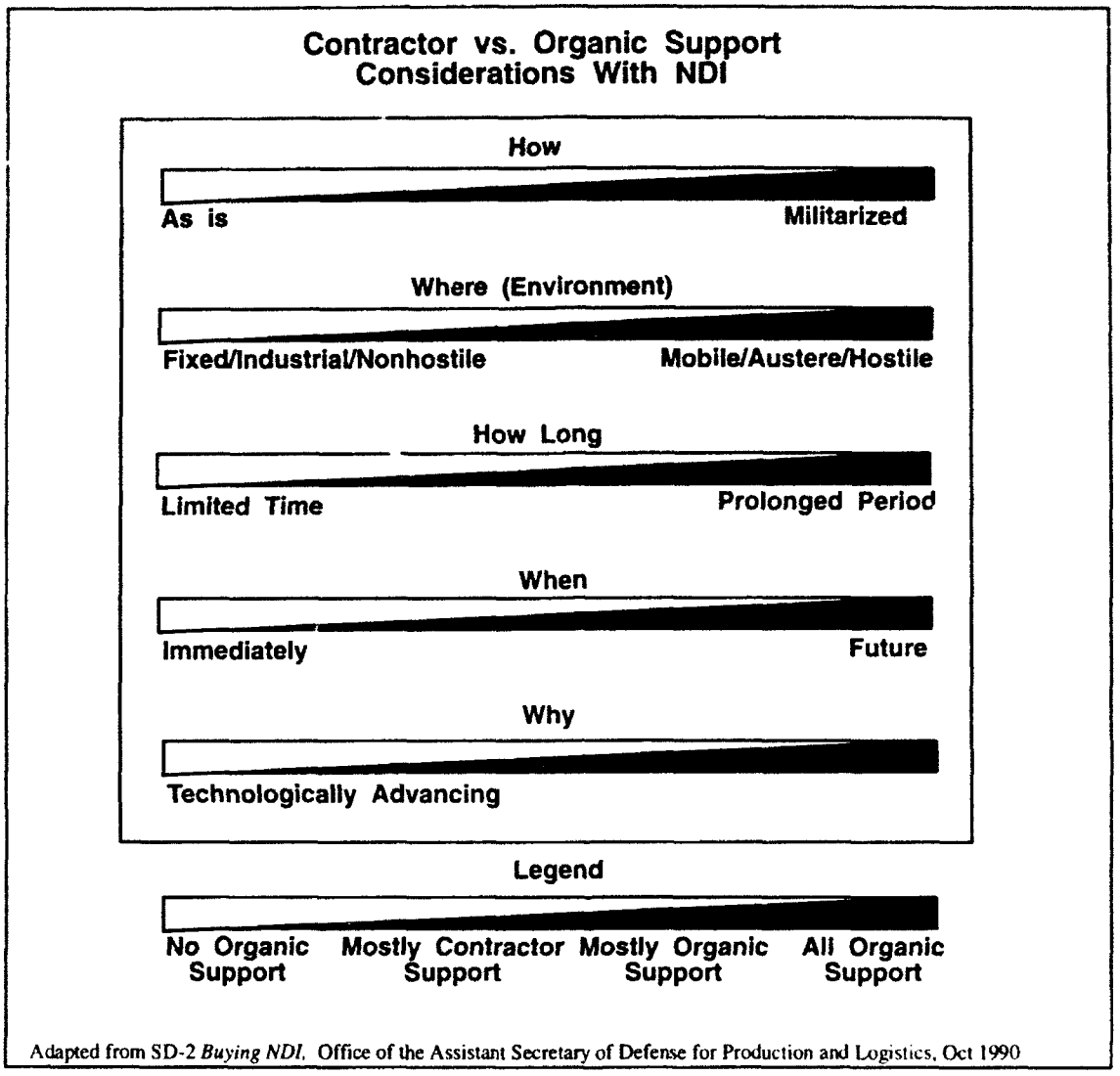
As the ILS planning process occurs, support decisions are incorporated into the overall acquisition strategy. The issue of contractor vs. organic support is a critical decision. The OSD publication SD-2 provides the following figure and narrative as a guide to resolve this issue:

> There are five system use factors: How the NDI will be used from "as is" to fully militarized modification; where the NDI will be used, i.e., in what environment, from a fixed/industrial/nonhostile one to a mobile/austere/hostile one; projected service life; when the NDI is to be used, i.e., to be deployed immediately or sometime in the future; and, why an NDI is being selected, to take advantage of an advancing technology (with changing configurations) or the availability of a proven, stable design. Each use factor shows a range of support methods. These methods range from no support, which implies disposal upon failure to full organic support, and includes full contractor support and combined contractor/organic support. The proposed NDI and its system use factors may serve as a guide in planning the logistic support strategy. [8]

It should be emphasized that the utilization of these five system-use factors in the manner described in Figure 7 is flexible. For example, even though an NDI may be deployed in the future and will have a prolonged service life, contractor support may be desirable. The bottom line is that utilization of these factors assists in considering a support approach and does not represent a rigid method for decision-making.

In the Air Force "Joint Command Commercial Off-The-Shelf (COTS) Supportability Working Group (CSWG) Final Report," the CSWG recommended the following:

> Two policy changes are recommended. The policy changes should be incorporated into AFR 800-21, Contractor Support for Systems and Equipment. The regulation should be changed to read that contractor support is preferred for commercial acquisitions unless mission needs are not met. Because the vendor manages and controls the internal configuration of the commercial item, which is continually changing to meet the demands of the competitive marketplace, contractor support is the approach that best allows the Air Force to support this item. Contractor support permits configuration changes without the changes



Adapted from SD-2 *Buying NDI*, Office of the Assistant Secretary of Defense for Production and Logistics, Oct 1990

Figure 7. **File System Use Factors**

impacting the end-user and without the requirement for a continued update of a military organic support system intended for use with developmental items. In addition, whether it is a vendor or third party who provides the support, the Air Force should accept commercial support because it is often readily available, has a proven track record, and is competitively priced. Contractor provided data, including data on equipment usage and operation, general maintenance tips, recommended spares, etc., should be accepted in contractor format. Special provisions to procure military specification, government formatted data should be avoided.

When operational requirements dictate an organic support approach, the Air

Force should evaluate the requirements for technical data on a case-by-case basis. Commercial item documentation should be limited to data that permits the Air Force to perform minor maintenance on and to operate the commercial item. Source control, specification control, and interface control drawings are recommended for inclusion in the technical data package for commercial items integrated into a system.

The second policy change should state that vendor support concepts should be applied whether the support is organic or contract. The Air Force should not create a support approach that varies from the commercial mainstream for that item. For example, the Air Force should not remove and replace circuit cards when the vendor concept is to remove and replace black boxes. The Air Force should not perform field level repair of circuit cards when the vendor repairs cards at the depot level. Before the commercial item support concept is selected or changed, a thorough life cycle cost and effectiveness analysis should be done and all affected commands coordinate on the decision.

Finally, the Air Force should select the vendor support approach that meets its needs. (Note: The apparent conflict with the previous paragraph is recognized; however, it was not changed to maintain the integrity of the quote.) If the vendor has options for support, or different approaches, the Air Force should select the approach that best meets its needs. These policies require the Air Force to define the support concept early, specify it, and select vendors whose support approaches meet Air Force needs without modification.[9]

You should note these recommendations apply to commercial-off-the-shelf items and not the full spectrum of NDI. One should consider that the environment the Air Force operates in is often "friendlier" than that in which the Navy or Army may be operating. However, these recommendations to support approaches represent a major shift in thinking relative to ILS and may be the reason why, when utilized in some DOD NDI programs, the ILS has been so effective.

Potential benefits of contractor support, as recommended in the Air Force study, were recognized by DOD and included in DODI 5000.2 as shown below:

(1) Programs using commercial systems or equipment should make maximum use of existing commercial logistics support and data. Development of new organic logistics elements will be based on critical mission need or substantial cost savings.

(2) It may be necessary to modify existing logistics support procedures, varying from established practices, to allow for maximum use of nondevelopmental items. This may involve innovative logistics concepts to support accelerated logistics support schedules and require acquisition techniques such as buy outs, warranties, and data rights escrow. The use of these techniques and concepts is preferred to developmental effort.

(3) Manufacturer or supply source distribution channels should be used in supplying commercial product and other nondevelopmental items to operational users when:

(a) It is economically advantageous; and

(b) The impact on military readiness and wartime sustainability is acceptable.[10]

The OSD Publication SD-2 discusses the tailoring of Logistics Support Analysis (LSA) for use in the NDI acquisition process and in NDI selection and support decisions. The flow diagrams from SD-2 were adapted from *The COTS (Commercial Off-the-Shelf) Book,* published by the U.S. Air Force and from the *Systems and Procedures Manual,* published by Naval Sea Systems Command. These flow diagrams are presented on the next two pages.

Utilizing logistics support analysis is beneficial during the market investigation, drafting of requirements documentation and the ILS planning process. Its use can focus on potential problems and lead to sound solutions. It defends development of logistics support concepts.

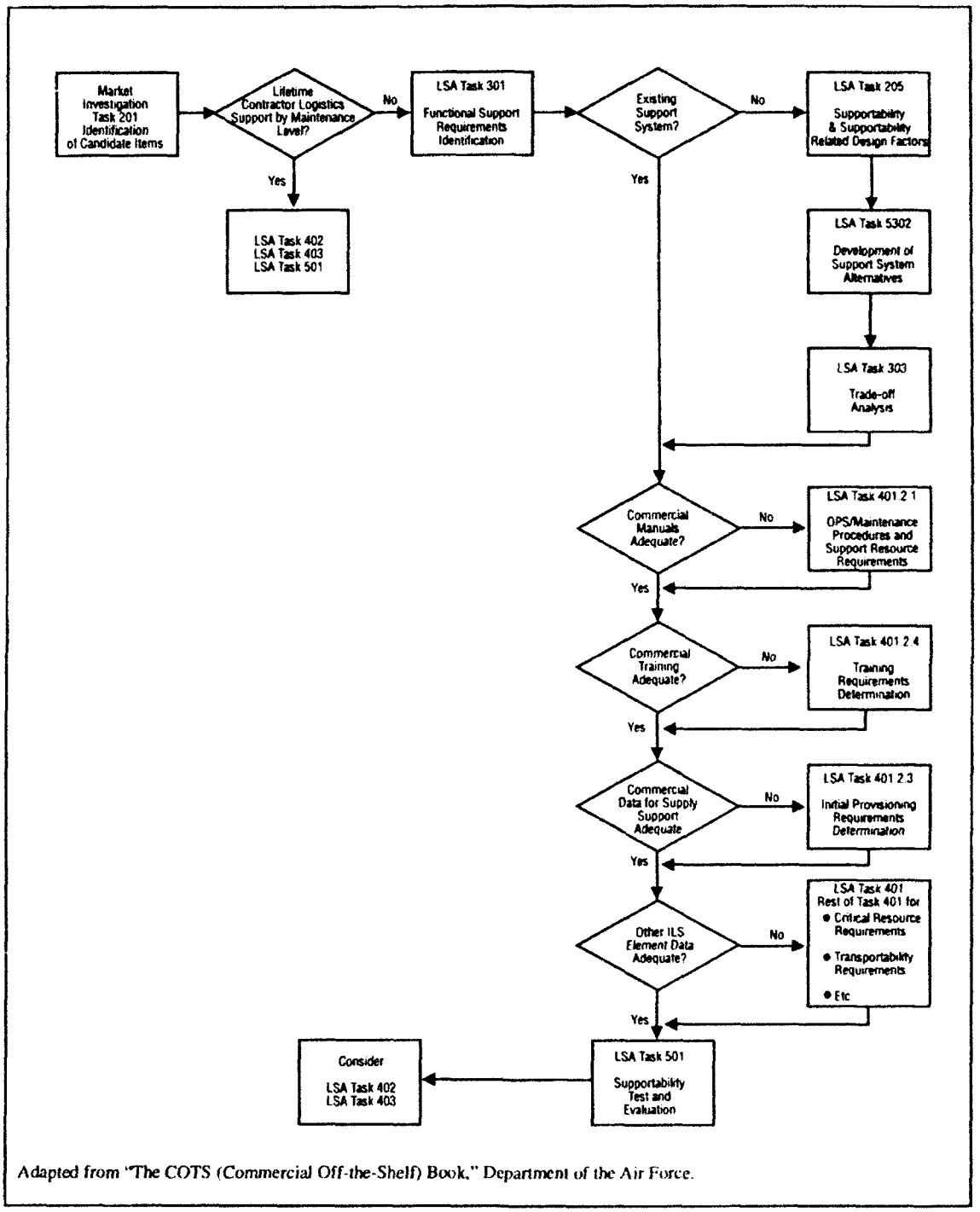
Incorporating ILS into NDI Requirements Documentation. The culmination of the ILS planning process and related incorporation of support decisions into the acquisition strategy is the blending of logistics needs into the requirements documentation and the subsequent procurement documents. As stated in AMC/TRADOC PAM 70-2, "The key to NDI is the procurement of a total package including spares, repair parts, and other support."[11]

As discussed in the previous chapter on requirements generation, the definition of the user's requirements is a critical point in the acquisition of any item — developmental or nondevelopmental. Once again, because of the nature of NDI, it is more critical. The trade-off process between user and support requirements must be conducted carefully and thoroughly. Since the support strategy is closely tied to the NDI, an error in properly defining the requirement could lead to future major supportability problems. In its report, the Air Force CSWG highlighted two problems in the requirements process for NDI:

> First, initial requirements documents are developed without careful consideration of what is currently available as NDI. This can happen when the operational community develops the requirements document focusing only on operational needs independent of "solutions" to the needs. Once these documents are developed, it is difficult for the user to "back off" from validated requirements and to accept an available NDI solution which does not meet all of the stated requirements. Modified NDI often is the result.
>
> A second type of problem occurs when the user develops a requirements document based on available commercial technology rather than available commercial products. Under this approach, several desired functions or capabilities which might exist in several different commercial products are combined into a single requirements document. Yet, no existing commercial item can provide all of the functions or capabilities without modification.[12]

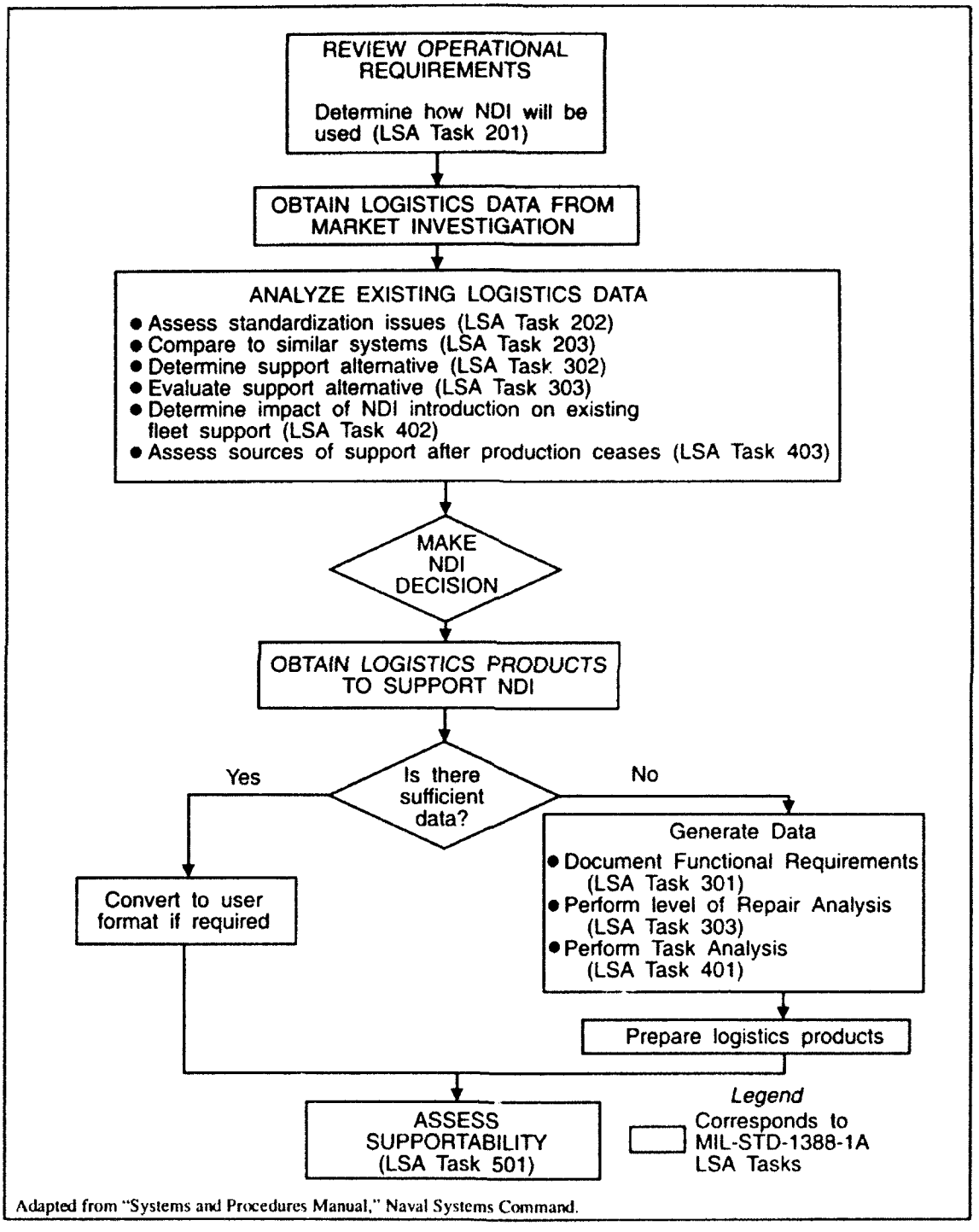
In both cases, the item becomes "modified NDI," and the DOD may find itself with a "unique" item. Benefits of utilizing the commercial support base, which normally would support the unmodified item, are reduced or eliminated. The DOD would find it necessary to procure expensive technical data to properly support the item.

The CSWG highlighted the importance of a disciplined market analysis function, linked to the requirements process in an iterative manner, as the key to resolving this problem. The iterative nature of the process will ensure



Adapted from "The COTS (Commercial Off-the-Shelf) Book," Department of the Air Force.

Figure 8. **Logistics Support Analysis (LSA) Flow Diagram**



Adapted from "Systems and Procedures Manual," Naval Systems Command.

Figure 9. **LSA in the NDI Acquisition Process**

that, before solutions to the requirement are solicited from potential contractors, all disciplines involved in forming the requirement are coordinated; and their individual portions of the requirement are compatible.

Communicating the requirement to potential contractors has all the problems and pitfalls normally associated with any communications process between two parties. Requirements must be clear and concise. Government intentions must be totally understood by potential offerors. The extent to which the government desires support for the item being procured must be delineated as clearly as the description of the item. This is not to say that the solicitation must include descriptions on what or how to build and support the item. However, all functional requirements, including supportability, must be clearly spelled out; and potential offerors must be told what information relative to ILS must be included in their proposals.

To facilitate this flow of information between government and contractor, AMC/TRADOC Pamphlet 70-2 and DOD Publication

SD-2 list specific logistics-related information that should be required from offerors relative to their product. This information includes:

- Description of supportability characteristics
- Pricing information for repair parts and consumables required to support the NDI, including support and test equipment. Identification of all current sources of each repair item with justification (e.g., reliability, price) for preferential selection of sources
- Plans for ensuring availability of products, components, and repair parts over the intended life cycle
- Description of data, documentation, manuals, and training materials to be furnished or available
- Proposals and pricing data for contractor logistics support and associated warranties as required in the proposal
- Identification of the types of skills and quantities of personnel required to operate, maintain, and repair the NDI when employed in the intended environment
- Certification/evidence that the NDI meets service health and safety requirements stated in the solicitation document
- Identification of proprietary items and data rights
- Description of proposed warranty procedures.[13]

In some cases, contractors may not find it possible or desirable to provide all of the information outlined above. In fact, some requests for this information may cause a potential source not to propose. More discussion relative to these items will be covered later in this chapter and in Chapter 6 on contracting issues.

ILS and Source Selection. Finally, source selection criteria will be determined during this stage of the NDI acquisition process. Support objectives for the NDI developed during earlier stages of the process should be included in the NDI source-selection criteria.

The *Commercial Practices for Defense Acquisition Guidebook*, published by the Defense Systems Management College, lists the following logistic factors that should be considered when determining which contractor's proposal represents the best value to the government:

> Often the products identified in a solicitation must be integrated into an already established complex logistics system. The greater the degree of compatibility

between the existing products and those offered in response to a new solicitation, the lower the cost and impact of integration.

(a) Is the integrated logistics support plan comprehensive enough to identify any difference in cost and other resources among offers?
(b) Should the degree of compatibility with existing logistics systems be considered?
(c) Is there more than one source for repair/support?
(d) Are commercial operating, maintenance and training manuals available and adequate?
(e) Is the establishment of an organic maintenance capability required? If not, can the contractor provide the required support?
(f) Is the commercial warranty offered workable in the use profile of the product?
(g) Does the contractor have a history of honoring warranty agreements and cooperating in problem resolution?[14]

NDI CONSIDERATIONS FOR SELECTED ILS ELEMENTS

To comprehend fully the ILS issues related to NDI acquisition, it is beneficial to examine several ILS elements and the NDI considerations relative to each.

Technical Data. It is important to start any discussion of NDI and the individual ILS elements with a look at technical data since its content and availability could determine the manner in which other elements are fulfilled. As outlined in DODI 5000.2:

(1) Technical data is required to define and document an engineering design or product configuration (sufficient to allow duplication of the original items) and is used to support production, engineering, and logistics activities.
(2) A technical data package shall include all engineering drawings, associated lists, process descriptions, and other documents which define the physical geometry, material composition, performance characteristics, manufacture, assembly, and acceptance test procedures.
(3) Technical data which provides instructions for the installation, operation, maintenance, training, and support of a system or equipment can be formatted into a technical manual.[15]

As can be seen from the preceding, technical data includes a very broad range of information. The DOD policy as to how much information is acquired is stated in DODI 5000.2 as follows:

The DOD component having management responsibility for an item shall ensure that the Government has complete access to the data necessary to support the essential requirements of all users throughout the item's life cycle. This access may be achieved by:

(1) Procuring, storing, and maintaining the necessary data in a Government data repository; or
(2) Procuring access to the data through a contractor integrated technical information service.[16]

In its discussion of "Establishing Data Requirements," DODI 5000.2 states:

Only the minimum data needed to permit cost-effective support of research, development, production, cataloging, provisioning, training, operation, main-

> tenance, and related logistics functions over the life cycle of the item will be acquired.[17]

That same section specifies preference for contractor format data and maximum use of commercial technical manuals. This preference is qualified to the extent that this data meets DOD component requirements and that technical manuals match reading-and skill-levels of the target reader. Acceptance of commercial data consistent with the user's operational needs is highlighted in Section 6L (Nondevelopmental Items) of DODI 5000.2.

A problem associated with the acquisition of technical data relative to an NDI acquisition is one of data rights.

> Data rights refers to the authority to use, duplicate, or disclose data. The Government acquires data rights to develop specifications, to increase competition, and to foster technological development. Industry perceives that the release of data to competitors will erode their competitive edge, and has cited this as a major impediment for doing business with the Government.
>
> Because data rights are considered "proprietary", commercial firms are reluctant to disclose technical or other data to customers. Commercial contracts do not request this kind of data because it is not a sound business practice. DOD buyers should consider depending more heavily on alternatives, such as warranties and training, as do their commercial counterparts, resorting to acquiring data rights as a last option instead of a first option. If necessary, licensing is available as an alternative to purchasing technical data, e.g., exclusive, semi-exclusive, or nonexclusive licenses.[18]

The problem of data rights was highlighted in a report by the Center for Strategic and International Studies (CSIS) entitled "Integrating Commercial and Military Technologies for National Strength — An Agenda for Change." The CSIS report stated:

> DOD considers obtaining rights to technical data essential to operating, repairing, and maintaining its equipment and limiting potential price gouging by sole producers who may control the market and hence the product price. At the same time, DOD's emphasis on obtaining unlimited rights in technical data, including the right to distribute proprietary information to competitors has created a major barrier to commercial and military integration. Under current regulations, a company could well lose its proprietary rights. This makes firms extremely reluctant to incorporate commercial technologies into DOD contracts. The emphasis on unlimited rights also discourages companies from exploiting the commercial opportunities of defense-supported technologies. Experience has shown that technologies that are potentially available to all companies will be exploited by none.[19]

The CSIS had the following recommendation relative to this problem:

> In the area of technical data rights, the Committee's recommendations attempt to create a better balance between industry's proprietary rights and DOD's data requirements. The intent here is to constrain the government's demands for unlimited rights in data and software. These demands discourage companies from both incorporating commercial technologies into defense contracts and exploiting commercial opportunities arising from defense investments. We

> have proposed expanding the use of government purpose license rights (GPLRs), which provide DOD with unlimited access to data for internal use but which grant the contractor exclusive commercial rights to data. Under the proposed modifications to GPLR, DOD would not request data for which it had no need (e.g., for competitive reprocurement) and would be required to justify that alternative procurement procedures were insufficient before releasing a technical data package to other contractors.[20]

The study includes procurement of the Future Secure Voice System (or STU-III) from Motorola as an example of successful compromise on technical data rights. It includes an extensive discussion concerning the issue during the last 35 years, providing valuable insight into problems associated with data rights relative to NDI acquisition.

In response to this issue and others relating to acquisition of commercial items and as a result of Section 824(a) of the FY 90/91 National Defense Authorization Act, the DOD amended DFARS, Part 211, "Acquisition and Distribution of Commercial Products," with the addition of Subpart 211.70 entitled "Contracting for Commercial Items." The issue of technical data rights is somewhat resolved by placing restrictions on release, disclosure and use of technical data provided in contracts for commercial items. However, there is concern within the commercial sector that the contracting officer's interpretation of the provision may continue to be an impediment to acquiring NDI.

To overcome inherent problems relative to technical data in an NDI acquisition, effective communication with potential sources within industry must take place as early as possible. Depending on industry's willingness to provide data which it may rely upon as a competitive advantage or their ability and willingness to format that data as required by the government, the feasibility of pursuing an NDI acquisition will be apparent. Supportability problems may arise if the government wants organic support and training, Military Standard (MILSTD) technical manuals, or competitive reprocurement of spare parts and if the potential sources of the NDI are not willing to provide required data or the government is not willing to pay the price. This was the case with the Light Armored Vehicle, LAV-25, acquired for the Marine Corps. In a thesis for the Naval Postgraduate School, Major Francis A. Quindlen, Jr., presents the problem as follows:

> Combining a nondevelopmental system and an accelerated acquisition strategy produced a near-term focus that lacked sufficient consideration for long-term logistic support. This thesis identifies the inability to competitively reprocure spares and repair parts and the lack of a post production support plan as the two most serious problems in the fielding of the LAV-25. The lessons learned are that competitive spares reprocurement and post production support must be comprehensively planned for prior to award of a nondevelopmental production contract.[21]

Other options which help overcome concerns related to lack of a complete technical data package include use of warranties and data rights escrow.

> The use of commercial warranties can reduce the need for data reprocurement rights, since customers would rely on the supplier to service/fix a product instead of the customer expecting to do it, necessitating the acquisition of the data required to enable him to do so.[22]

The other option, data rights escrow, involves an agreement to deliver a detailed technical data package at a later date, normally when production is nearing completion or when the information no longer represents a competitive advantage for the manufacturer. This is primarily useful when DOD will be maintaining an older model than that carried in the commercial marketplace.

Relative to technical data the bottom line is that the government must determine its initial support requirements, data necessary to fulfill those requirements, sources of the NDI willing or capable of providing required data, and do any trade-off analysis required. The government must then adjust or confirm support strategy relative to acquisition strategy; adjust data requirements, if necessary; and procure the data. Implementing a thorough, coordinated, iterative process based on detailed planning ensures that this acquired technical data results in an effectively supported NDI.

Maintenance Planning. Much of what has been discussed previously in this chapter relates directly to maintenance planning. The exchange of information between government and industry in the market investigation/market analysis process, with consideration of various factors such as density, environment, availability and format of technical data, warranties, etc., provides for the iterative generation of a maintenance concept as part of the support strategy. The resultant decision to use organic support, contractor support or a mix as an interim or long-term measure is a product of the trade-off process previously discussed.

The approach taken toward maintenance planning in various NDI-related publications and studies is notable. DOD Publication SD-2, published in 1990, initially leads the reader toward organic maintenance, at least below depot level:

> 8.2.1 Maintenance Planning. The initial maintenance concept generally accepted for most NDIs is to provide the user organization with the capability for fault isolation to the Line Replaceable Unit. This is done through the use of built-in-test-equipment or the use of test measurement and diagnostic equipment test procedures. The maintenance technicians in the user organization then remove the Line Replaceable Unit and replace it with a working element, sending faulty units to the Intermediate Maintenance Activity or Depot. Intermediate facilities would stock units for direct exchange purposes. Note that both organizational units and intermediate levels are usually manned by operators and maintenance personnel. Items not replaced at the intermediate level are shipped to a depot, which may be manned by military, civilian, and/or contractor personnel. Depots usually have the capability to repair to the piece-part level. It is important that criteria and subsequent maintenance concepts be identified and transition plans formulated when required.[23]

The next page of SD-2 introduces the possible use of existing commercial or other maintenance and support systems and discusses factors that influence the decision, as well as possible support strategies utilizing the services of manufacturers of commercial items.

In contrast to the presentation of the topic in SD-2 is the recommended approach presented in the Air Force CSWG Final Report, published in 1991. The recommendations were given previously in this chapter. They include a strong recommendation for initial consideration to be given to contractor support rather than organic support.

Preference for contractor support of NDI is taking hold throughout DOD. Confidence in this approach grew substantially, based upon many cases of successful contractor support during Operation Desert Storm. This shift in thinking will be reflected as publications such as SD-2 are rewritten.

In general, it is impossible to state that one approach is better than the other. Dialogue with industry, as to what is necessary, and an iterative process of trade-off analysis, considering all pertinent factors, is what must happen. Decisions must be based on sound logic, rather than a "business as usual" mind-set.

Supply Support. Several issues related to supply support have been discussed. The decision on which level repairs will be performed and who will perform them (contractor, organic, mix) will have a direct impact on spares/repair parts requirements. Availability of technical data for reprocurement/spares breakout will influence sources of supply support. The issue of the "business-as-usual" mind-set was discussed previously; in this case, the tendency is to buy Level III drawings and documentation to the piece-part level or LRUs. This approach often is expensive and may lead to procurement of poor-quality parts. More importantly, the government's insistence for such detailed technical data may cause potential offerors of highly desirable NDIs to refuse to offer their product, as outlined in the discussion of technical data.

Effective supply support is possible with an NDI. The LAV-25 program utilized a Recommended Buy List (RBL) from the contractor, which recommended quantities of spares and repair parts sufficient to support the LAV-25 during the first 12 months of initial fielding. An approach such as this is consistent with Spares Acquisition Integrated with Production, as outlined in DODI 5000.2. This, combined with interim contractor supply support, will ensure supportability while the screening and cataloging activities of the provisioning process are taking place.

Another effective method to provide supply support to commercial items, the Contractor Operated Parts Depot (COPAD), has been in operation within the Defense Logistics Agency since 1980.

The COPAD was established as part of the Defense Construction Supply Center (DCSC), Columbus, Ohio, and is operated by a civilian contractor. It has a facility collocated with the Contract Administration Office and a packing and shipping facility at Defense Depot Mechanicsburg Pennsylvania (DDMP). The DOD users of commercial equipment, such as commercial construction equipment, commercial material handling equipment and commercial vehicles, submit part numbers or national stock numbers (NSNs), if assigned, on a requisition to DCSC. The DCSC processes the requisition and places an order against the COPAD contract. The contractor maintains sources for the needed parts, procures the item, and delivers it to the DDMP for packing and shipping to the DOD user. The COPAD contract is awarded to the contractor offering the largest discounts to the government for various parts from certain commercial equipment prime and/or brand name manufacturers, or common replacement parts. The contract allows for payment incentives to the COPAD contractor for quick delivery of the part. In this way the DOD normally gets quick delivery at very competitive prices.

The COPAD has been successful in achieving its goals:

— Support the military customer,
— Reduce order shipping time,
— Eliminate lost shipments,

— Reduce mode of shipment violations,
— Use commercial market to maximum,
— Provide current, accurate status.

The COPAD supports 45,000 NSNs and four million part numbers. The COPAD contract covers approximately 300 vendors (600 vendor codes). The DCSC processes about 7,000 requisitions per month through the COPAD with an average order shipping time (from date of user requisition to user receipt) of 34 days. The COPAD provides an excellent example of how effective supply support can be provided to users of NDIs.

Concern has been expressed about buying NDIs because the manufacturer may discontinue production and support of the equipment while the item is still used by DOD. Potential problems of this nature should be discussed with potential offerors early in the NDI acquisition process. If the possibility exists that production and support might cease before a time desirable by the government, several options exist. The government may want to buy upgrades as commercial models evolve. This is sometimes done in unstable technology areas, such as computer hardware and software.

Another alternative is a onetime purchase of spares. This could be made when the end-item is procured or through an agreement requiring timely notification be made to the government for purchasing of spares. Finally, arrangements can be made to obtain technical data sufficient to solicit sources of supply support concurrent with the end of the manufacturer's production/support. This concept, called data rights escrow, is often more palatable to manufacturers than providing Level III tech data up front because it does not result in loss of any competitive advantage since the tech data is transferred at a time when the NDI is no longer a competitive product for the manufacturer. Some reservations have been expressed about data rights escrow. Sometimes, this data is not kept updated (this may or may not be desirable). Also, in the case of bankruptcy, this data may be considered an asset of the company; and transfer to the government may be delayed by legal proceedings. However, proper coordination and communication with the contractor could preclude these events.

CONCLUSION

One of the toughest challenges in NDI acquisition is ensuring effective ILS. Acquisition lead time is reduced, leaving less time to do the planning for, and development of, organic support. However, NDI may have support in place since, in many cases, the item is being used, broken and fixed. Therefore, a support structure, training and reliability data may already exist.

Potential supportability problems must be addressed early in the NDI acquisition process. As part of the market investigation, logistics support requirements must be provided to industry. Their feedback will provide the information necessary to facilitate the subsequent trade-off decisions that must take place.

As the overall acquisition strategy is coming together, coordination between logisticians and other functional elements must occur. Critical logistics support requirements should be identified and included in other functional planning documents, such as the TEMP. Additionally, any existing data relative to testing of logistics requirements should be identified.

The ILSP is developed in conjunction with the overall acquisition strategy. Thorough planning is critical to ensuring effective ILS. The trade-off process at this stage in the acquisition should identify risk areas which can then be planned for. One critical decision would be a support approach of organic support, contractor support or a mix. A major impedi-

ment encountered at this point is the mind-set hat only organic support can provide effective ILS. Sound logic must overcome this "business as usual" mind-set.

As requirements documentation and subsequent procurement documentation are generated, ILS requirements should be "tailored" to fit other functional requirements. Those requirements, as presented in the solicitation, must be clear, concise and totally understandable by potential industry sources.

The support objectives should be included in the source-selection criteria. This will help ensure that the NDI, given to meet user needs, will be supportable when put to use.

ENDNOTES
Chapter 5

1. DODI 5000.2, p. 15-7.
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3. NSIA "COTS/NDI" Study, p. 16.
4. *Ibid*, p. 17.
5. *Ibid*, p. 18.
6. AF COTS CSWG Final Report, p. 5.
7. SD-2, p. 8-1.
8. SD-2, p. 8-3.
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11. AMC/TRADOC Pamphlet 70-2, *Materiel Acquisition Handbook*, 1987, p. 17.24.
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13. SD-2, p. 8-5.
14. Defense Systems Management College, *Commercial Practices for Defense Acquisition Guidebook*, January 1992, p. 3-9.
15. DODI 5000.2, p. 9-B-2.
16. DODI 5000.2, pp. 9-B-2, 9-B-3
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18. DSMC, *Commercial Practices for Defense Acquisition Guidebook*, p. 9-6.
19. The Center for Strategic & International Studies (CSIS), *Integrating Commercial and Military Technologies for National Strength - An Agenda for Change*, March 1991, p. xiii.
20. *Ibid*, p. xvi.

21. Quindlen, Francis A., Jr., *A Case Study of the Light Armored Vehicle - 25: Integrated Logistics Support of a Nondevelopmental Item*, December 1989, p. iv.

22. DSMC, *Commercial Practices for Defense Acquisition Guidebook*, p. 9-8.

23. SD-2, p. 8-6.

"In short, our managers have been left with very little latitude to manage. We have confused regulation with management. In our eagerness to ensure that there will be no failures, we have reduced the possibility of successes."

—Kenneth L. Adelman
—Norman R. Augustine

Chapter 6

CONTRACTING IN AN NDI ENVIRONMENT

This chapter addresses the contracting-related considerations and impediments in an NDI environment. The NDI contracting philosophy is consistent with that of NDI acquisition as a whole. The Department of Defense (DOD) seeks to obtain the benefits discussed earlier—saving time, money and effort. In DOD, the actual process for buying NDI is mostly governed by the same regulations and laws as is the process for procurement of developmental items. Differences existing between the two processes arise from differences in source of the item and the contracting environment in which that source functions. These differences provide the greatest challenges and opportunities relative to contracting for NDI.

Commercial items are only one category of NDI. However, in the process of researching NDI acquisition, we found that the procurement of commercial items was a major focus of many previous studies, recent congressional activity and changes to procurement regulations. Because of the overwhelming focus on buying commercial items and using commercial acquisition procedures, this chapter also will concentrate on commercial issues in treating the broader subject of NDI contracting.

CONTRACTING CONSIDERATIONS IN AN NDI ACQUISITION STRATEGY

There are several contracting-related considerations which must be weighed when preparing the acquisition strategy for any item. These considerations include degree of competition available, contract type and procurement method. However, the decisions regarding these contracting considerations are not made in isolation. In fact, before decisions are made, it is necessary to thoroughly understand and define the requirement including the environment in which the item ultimately will be used. Also, the acquiring activity must have knowledge of available items to fulfill the requirement and an understanding of the industry and market from which the item comes. The market investigation and market analysis, which are part of an NDI acquisition process, are critical to achieving this understanding. Only after developing an adequate understanding and definition of the requirement, determining its end-use and accurately assessing the market from which the requirement is to be filled, can informed contracting-related decisions be made.

There is one additional factor which must be considered when defining the requirement,

the statutory preference for nondevelopmental items. This preference, as required by 10 USC 2325, was discussed in Chapter 1. The effect of this statute on the requirements generation process and the resultant contracting considerations cannot be overlooked. The failure to describe requirements in a manner that will permit NDI to be offered is a major impediment to buying NDI.

Competition in government procurement is required by Public Law 98-369, the Competition in Contracting Act (CICA) of 1984, which amended 10 United States Code (USC) 2304 and 41 USC 253. It requires the use of competitive procedures to obtain full and open competition for the procurement of property; i.e., goods or services. It requires that the executive agency making the procurement use the competitive procedures best suited to the particular circumstances related to that procurement.

The DOD implementation of CICA has been thorough. Its impact on the DOD acquisition process has been monumental. There is much debate concerning the overall benefit of CICA. But, one thing is sure; it significantly changed the DOD acquisition process. Some claim it resulted in extensive use of detailed specifications in procurements or successive buys to different sources, making it difficult to establish any long-term relationships with sources.

> Both the Government and commercial firms use competition, but their practices of it differ, especially regarding mandatory competition. The differences are founded in the basic nature of their roles in society and in the marketplace. For example, everyone has the right to sell to the Government, and there are numerous laws and regulations to ensure equal opportunity and fairness in the process. Absent justification to the contrary, Government buyers must use full and open competition with inevitable, sometimes frivolous, protests by losing offerors. In place of good judgement and common sense the Government acquisition process relies on detailed specifications to ensure fairness and to protect itself from protests. On the buying side of the relationship, everyone except the Government has the right to buy from anyone. There is no corresponding right for the Government.[1]

This differs from the commercial sector, which emphasizes quality and performance in addition to price. This "best value" approach facilitates improvements such as strategic sourcing with stable, long-term supplier relationships and innovations such as "just-in-time" delivery and inventory management.

The differences in government and commercial buying philosophies have resulted in a major impediment to NDI acquisition. In a presentation entitled "Obstacles to Additional Procurement of Commercial Items by DOD," Ms. Eleanor R. Spector, Director of Defense Procurement, gave the following example of statutory impediments to commercial item acquisition:

> In general, it can be said that any law which requires commercial activities to behave differently in their business dealings with DoD than they do with their private counterparts will impede DoD's ability to acquire commercial products, e.g.,
>
> - 10 USC 2305 (A)(1) requires us to describe our requirements in a manner that will achieve full and open competition (we can't restrict a buy to commercial products exclusively, nor can we buy on a sole source basis with dealers of our choice).

[NOTE: It is recognized that this wording is interpretive rather than statutory.][2]

This problem was presented to the Congress during hearings before the Senate Subcommittee on Oversight of Government Management, Committee on Governmental Affairs, conducted during 1989 and 1990. A subcommittee member, Senator William S. Cohen of Maine, was an author of CICA. He and the subcommittee chairman, Senator Carl Levin of Michigan, challenged government witnesses from DOD and the Office of Federal Procurement Policy (OFPP) when CICA was presented as an impediment to the use of commercial off-the-shelf items. The senators seemed to feel the problem was one of faulty interpretation and implementation of CICA by DOD. The senators rejected specific problems related to CICA and market surveys, CICA and awards based on quality-related factors, or CICA and the use of detailed designed specifications. They were adamant that CICA did not preclude market surveys, quality-related award factors, or require the use of detailed design specs. In fact, CICA does not preclude awards based only on low price or require use of design or detailed specifications.

The discussion on CICA's impact on defense procurement continued in the House of Representatives. In hearings on acquisition issues before the Investigations Subcommittee, House Armed Services Committee, conducted on March 29, 1990, the Honorable Nicholas Mavroules submitted a prepared statement highlighting the impact of General Accounting Office (GAO) discussions relative to award without discussions and DOD implementation of CICA. Ms. Spector gave supporting testimony in these hearings.

Although dialogue among the Congress, DOD and OFPP never resolved the root cause of the problem, it seemed to be a catalyst for change. Language like that contained in Section 824, Public Law 101-189, and Sections 802 and 803, Public Law 101-510, and subsequent changes in the Federal Acquisition Regulation (FAR) and DOD FAR Supplement (DFARS), including DFARS 211.70, "Acquisition and Distribution of Commercial Products," are significant steps toward simplifying acquisition of commercial products. Specifically, guidance on handling one offer, and clarification of the ability to make a "best value" award without discussions as a result of requests for proposals, make it easier to work with CICA in an NDI acquisition environment.

The other contracting-related considerations for an NDI acquisition strategy are contract type and procurement method. In most cases, a fixed-price contract would be anticipated when buying NDI. The only exception might be when the NDI will be modified or when extensive testing will take place, as may be the case when buying a prototype. In this instance, it may be appropriate to utilize a cost-type contract if the level of risk justifies it. (Noted that 10 USC 2325 defines NDI in a way that precludes significant modifications from being considered NDI.)

There are several procurement methods which may be utilized for the acquisition of NDI. If the procurement is noncompetitive, a request for proposal (RFP) should be issued and negotiations utilized to reach agreement with the sole source. However, the noncompetitive nature of the acquisition must be supported by adequate market investigation and analysis and a written determination (justification and approval). If the procurement is competitive and a cost-type contract is anticipated, a request for proposals should be issued; and the source whose NDI best meets government needs according to the evaluation criteria in the RFP can be selected. This can be done with or without discussions. If

discussions are held, they must be with all potential sources determined to be in the competitive range.

As stated, a large percentage of contracts for NDIs would be fixed-priced and arrived at through competitive procedures. But, the procurement method utilized would vary, based upon the requirement and analysis of the market providing it. Consideration of the requirement may include factors like its expected life, environment in which it will be used, supportability, reliability, and integration or interface with other items or systems.

The three methods available to the government are sealed bidding, two-step sealed bidding and competitive proposals.

When it is certain that any of a number of commercially available products can satisfy the requirement, sealed bidding is an option. When using sealed bidding, however, you must keep in mind the statutory requirement of 10 USC 2325 (a) that states:

> ...to the maximum extent practicable —
>
> **(1)** requirements of the Department of Defense with respect to a procurement of supplies are stated in terms of -
>
> **(a)** functions to be performed;
> **(b)** performance required; or
> **(c)** essential physical characteristics
>
> **(2)** Such requirements are defined so that nondevelopmental items may be procured to fulfill such requirements.[3]

In an NDI acquisition, the utilization of level-three drawings or precise design specifications are considered an impediment. It must be stressed that, if you use the sealed bidding procedure, adequate market surveillance, investigation and analysis should confirm that any number of commercially available products satisfy the requirement. Then, the contract would be awarded to the responsible and responsive offeror submitting the lowest bid.

An alternative, when price is the primary determinant in the procurement of an NDI, is two-step sealed bidding. Specific procedures are involved in using the two-step process. In step one, technical proposals are submitted by offerors and evaluated to determine which items are technically acceptable.

The technical proposal step allows the use of less restrictive specifications than in normal sealed bidding. It also allows for examination of supporting data to consider manpower requirements, supportability (provisioning, manuals, etc.), quality history, and reliability as part of the evaluation process for technical acceptability. Once technically acceptable offers are identified, sealed bids are submitted for those offers.

The award is made to the lowest-priced, technically acceptable offeror. When using this procurement method it must be realized that price is the primary determinant in step two. The group of offerors may contain a wide range of technically acceptable offers, some of which are far superior to others. However, if those offerors have not submitted the lowest *priced* offer, even if the price difference is minimal, they cannot be given the award. It is important to realize this limitation when utilizing the two-step sealed bidding procedure.

Another procurement method appropriate for an NDI acquisition is competitive proposals. Competitive proposals are considered to be a form of negotiated procurement, which may lead one to believe that utilization of this

method would require discussions with offerors prior to award.

However, as outlined in Section 802 of the FY 91 Defense Authorization Act, the government may award a contract after the submission of competitive proposal:

> (i) after discussions with the offerors, provided that written or oral discussions have been conducted with all responsible offerors who submit proposals within the competitive range; or
>
> (ii) based on the proposal received, without discussions with the offerors (other than discussions conducted for the purpose of minor clarification) provided that the solicitation included a statement that proposals are intended to be evaluated, and award made, without discussions.[4]

The requirement for discussions must be based on an examination of evaluation factors, the basis for award and the government's ability to determine their value in each offeror's proposal with or without discussions.

This brings us to a major difference between competitive proposals and the sealed-bid methods of procurement. With sealed bidding and two-step sealed bidding, the primary determinant for award is the low bid from a responsive, responsible offeror. When using competitive proposals, this is not the case. Using this procedure, awards can be based primarily on technical merit rather than just low cost/price. It is important to understand the difference between the terms "price" and "cost." The distinction was made in the House Armed Services Committee report for the FY 91 Defense Authorization Act (Report 101-665):

> Price is used in the statute to connote the purchase amount for the items being delivered under the contract and includes such factors as differences associated with transportation from varying locations or the application of state and local taxes. Cost is used when connoting the concept of the outlay or expenditure the government will make, typically over the life of the product, and the value to the government expressed in monetary terms.[5]

The report continued later, stating:

> Cost also encompasses "technical" factors such as quality, design, technical capability, management capability, past performance, and cost discipline, etc., to the extent those factors can be translated into a monetary context, and offerors can be given a clear indication in the solicitation how those factors will be quantified.[6]

The Congress took the discussion one step further. It recognized this "best value" approach was extremely difficult to quantify objectively, but also was extremely important to successful, effective government procurement:

> The committee does, however, recommend the adoption of several minor changes to section 2305 (a)(2)(A) to clarify that competitive negotiation procedures are used not only to allow an evaluation of cost as opposed to price, but also to allow consideration of technical factors that cannot be quantified in cost terms. While they may not be objectively quantifiable, factors such as past performance, technical capability, management capability, design, quality, and cost discipline, are important and necessary aspects of determining which

> contractor will provide the best product or service to the government for the money. In many instances these technical factors are more important than quantifiable lowest overall cost.[7]

These words were critical to the support of "best value" contracting in DOD. Awards based on best value are not a new concept. As a rule, particularly for systems procurement, DOD recognized it had the ability to make awards on a combination of cost and other factors; and, therefore, awards to the lowest-priced offeror were not mandatory. However, in this case, the Congress now was formally recognizing the fact that there is a degree of subjectivity in selection of "best value," and gave DOD some assurance that it could award on that basis without discussions and not fear adverse GAO decisions as it had in the past.

The key to effective use of the competitive proposal procurement method is good communication. There must be good communication among all members of the acquisition team so that the total requirement is understood. What really is being purchased? It is probably more than just hardware; it is hardware that is reliable, usable, supportable, and integratable. This hardware will offer the user the highest degree of confidence.

For the acquisition strategy to include the competitive proposal procurement method, these "values" must be understood by the procurement team members. They must, in turn, communicate the "values" in the solicitation to prospective offerors and in the source selection plan, so that they can be thoroughly addressed by the offerors in their proposals and, subsequently, evaluated by the source-selection team.

If this communication takes place, and the procurement file properly documents the award decision in terms of these values, any "best value" award will survive a potential protest.

CONTRACTING—RELATED IMPEDIMENTS TO NDI ACQUISITION

Once the acquisition strategy, including the previously discussed contracting considerations, is finalized and funding committed to the procurement, the actual procurement process of solicitation, bid/proposal receipt, discussions (if necessary), evaluation, selection and award takes place. During this process, other impediments to the procurement of NDI arise. These impediments normally arise when the solicitation is reviewed by prospective offerors, because the offerors then encounter impediments like requirements for certified cost and pricing data, Truth in Negotiations Act certifications, lobbying certifications, socioeconomic certifications, government auditing rights and flow down of provisions to subcontractors.

These contractual impediments, the majority of which are statutory, were brought to the attention of the Congress during hearings before the Senate Subcommittee on Oversight of Government Management, Committee on Governmental Affairs, conducted in May and June 1989. The purpose of the hearing was to explore the Department of Defense track record pertaining to procurement of one group of NDI, commercial off-the-shelf items.

In testimony before the subcommittee, personnel from Boeing, John Fluke Manufacturing, Hewlett Packard, and Tektronix described how flow down requirements, certified cost and pricing data requirements, government cost accounting requirements, and excessive clauses were impediments to DOD's buying commercial off-the-shelf products. This message was heard before. Studies by various groups including the Packard Commission addressed one or more of these

issues. Attempts were made by DOD and the Congress, like those mentioned in discussing Public Law (PL) 101-189, 101-510, and DFARS 211.70, to remove these impediments. Unfortunately, studies and articles recently written still point to the fact that impediments continue to limit DOD's use of commercial products.

To understand this issue better, a closer look is warranted at several of the major impediments cited.

Government Cost Accounting Requirements. In its study, "Integrating Commercial and Military Technologies for National Strength — An Agenda for Change," the Center for Strategic and International Studies (CSIS) highlights the evolution of federal cost-accounting requirements and cost-and-pricing certification from the Hoover Commissions of 1948 and 1953, the Truth in Negotiations Act of 1962, creation of the Defense Contract Audit Agency in 1965, the Fitzhugh Commission in 1970, the Defense Production Act amendments in 1970, the establishment of the Cost Accounting Standards Board (CASB) in 1971 and the 1972 Commission on Government Procurement Reform. The enormous growth of federal and, in particular, defense procurement during this period, with associated problems of managing the growth, and the unfortunate cases of contractor fraud that arose, led to the statutory creation of cost accounting and certification requirements designed to ensure the federal government was paying fair and reasonable prices on its contracts. Unfortunately, it created a system separate and quite different from that in the commercial sector. The CSIS report describes the problem as follows:

> The cost accounting principles, standards, and reporting requirements pose a barrier both to DoD access to commercial state-of-the-art technology as well as the purchase of defense items produced in commercial facilities. Cost accounting requirements reinforce the need for a separation of commercial and military divisions not only because of the additional record-keeping costs imposed, which commercial firms are unwilling to charge off against profits, and contractor reluctance to open commercial accounts to government contact auditors, but also because defense requirements often differ from the firm's normal accounting system and are impractical to integrate with it (thus necessitating two separate accounting structures).[8]

Whether or not this impediment will be overcome is uncertain. In Section 26 of P.L. 100-679, "The Office of Federal Procurement Policy Act Amendments of 1988," the CASB was reestablished within the Office of Federal Procurement Policy (OFPP). The movement of cost-accounting standards authority from DOD to OFPP makes the process more formal and may delay needed changes.

In the cost-accounting requirements arena, differences such as how depreciation of capital assets is handled, the degree to which minor general and administrative costs are monitored, detailed record keeping relative to allocation of overhead costs to government work, and not being allowed to charge certain costs to overhead accounts that are acceptable in the commercial sector, have a substantial impact on a commercial company's profits. Low profits stifle growth and result in lack of stockholder investment.

The statutory requirement for certified cost and pricing data had a stifling effect on potential commercial suppliers. Some commercial vendors' cost-accounting systems are not structured to allow them to properly complete a Standard Form 1411. Moreover, the

exemption based on commerciality is often applied differently by each contracting officer.

The requirement for certified cost and pricing data and compliance with cost accounting standards (CAS) are major impediments when the government wishes to buy state-of-the-art technology from the commercial sector. Quite often, sources of this technology are in a sole-source position. In this case, to be exempt from CAS and submission of certified cost and pricing data, the contractor's price must be "based on established catalog or market prices of commercial items sold in substantial quantities to the general public."[9] The DOD is attempting to get a waiver to the "substantial quantities" requirement for commercial items. However, given the formal nature of the CASB, the probability is low for a timely decision — never mind a timely, favorable decision.

These individual issues combined with extensive auditing rights by the government and criminalization of the auditing process, have a chilling effect on the commercial sectors desire to do business with DOD. In the government search to obtain fair and reasonable prices, it has created a burdensome system overlooking the fact that normal competitive pressures in the commercial marketplace will, in most cases, ensure that the government will pay a fair and reasonable price for commercial items.

Unfortunately, the Congress either didn't recognize this or believe it was true. It preferred to attempt to control prices by statute rather than allowing natural forces of the marketplace to control them.

As mentioned, steps are being taken to overcome these impediments. In the "Report to Congress on the Defense Industrial Base," dated November 1991, the DOD said it "is also easing its requirements for cost and pricing data. DOD has proposed regulations that would allow more producers to waive this requirement and also streamline exemption procedures. The modification of requirements for certified cost and pricing data is expected to encourage more suppliers to offer commercial products to DoD."[10]

One change relative to submission of certified cost and pricing data involves the situation when only one offer is received in response to a solicitation for competitive proposals *for commercial items*. Section 211.7004-1(i), relating to certified cost or pricing data states:

(1) Contracting officers shall not require offerors to submit certified cost or pricing data or require offerors to obtain certified cost or pricing data from their subcontractors or suppliers when competitively acquiring commercial items including a sole offer received in response to a competitive solicitation if the criteria at 211.7004-1(o)(3) and (4) are satisfied.[11]

DFARS 211.7004-1(o), relative to one offer, continues:

(3) The contracting officer shall make an award in accordance with the procedures of this Subpart if the specifications did not unduly restrict competition and the initial assumptions of market conditions were valid. The offer received shall be considered an offer submitted under conditions of full and open competition. The offeror shall not be required to submit certified cost or pricing data or to obtain certified cost and pricing data from its subcontractors and suppliers.

(4) The contracting officer shall, if the specifications did not unduly restrict competition but the initial assumptions of market conditions were not valid:

(i) For sealed bids, proceed with award in accordance with the procedures at FAR 14.407.

(ii) For other than sealed bids, the contracting officer shall perform a price analysis to determine if the price offered is reasonable. If price analysis demonstrates that the price is reasonable, the contracting officer may proceed with award of the contract. The price offered shall be considered a price based upon adequate price competition. The offeror shall not be required to submit certified cost or pricing data or to obtain certified cost or pricing data from its subcontractors and suppliers. If price analysis alone cannot demonstrate price reasonableness, the contracting officer shall either cancel the solicitation or enter into negotiations with the offeror under the procedures at FAR Part 15 and DFARS Part 215.[12]

Another recent change which will help reduce this impediment is raising the threshold for submission of certified cost or pricing data for negotiated contracts and all modifications from $100,000 to $500,000. Subcontracts and modifications to them are included in the change, which applies to DOD, NASA and the Coast Guard. This change was required by Section 803 of Public Law (PL) 101-510, as amended by Section 704(a)(4) of PL 102-35.

Although these steps will not remove all government cost-accounting requirements related barriers, it is a sign that the Congress and the DOD are sensitive to th problem and want to do something about it. If it appears these measures are successful, others are sure to follow.

Excessive Clauses in Contracts for Commercial Item. Another issue raised during Senate hearings on oversight of DOD's inadequate use of commercial off-the-shelf items was excessive clauses DOD lists in its solicitations and incorporates into its contracts. Once again, this issue is continually raised as an impediment to DOD buying commercial items. Unfortunately, this issue appears to be tougher to address because it deals, in large part, with the federal government's use of procurement to benefit those needing it most. In a study entitled "Purchasing in the Industrial, Institutional, Governmental, and Retail Sectors: A Comparative Study," Michael G. Kolchin describes the issue in this manner:

> The federal government sees the procurement process as a means of carrying out social policy. This is clearly the case in the area of developing women-owned and minority-owned businesses. Recent legislation enacted by the government literally forces government contractors to seek out those firms as subcontractors in fulfilling the requirements of federal contracts. Examples of such legislation include PL 95-507 enacted in 1978 and PL 99-661 enacted in 1986. The first provides for set-asides, percentages of federal contracts that must be placed with small and disadvantaged businesses, and the latter requires that five percent of contracts entered into with DoD must be placed with minority business enterprises (MBE).

Sherman suggests that this acts as a restriction on a contracting officer's ability to place business in a competitive manner and, in a sense, conflicts with the overall objectives of the procurement process. However, such conflicts are inevitable as the federal government attempts to balance social and economic objectives. Perhaps still unanswered, however, are the questions of what these social objectives will cost or whether they will be achieved at all.[13]

For whatever reason, these numerous clauses are put into government contracts and create a burden on prime contractors and subcontractors, as a result of flow down. A witness before the Senate subcommittee explained:

> The myriad of remaining clauses and Government specifications are generally unacceptable to our commercial suppliers because they are organized to produce and sell their products using commercial business arrangements.
>
> These flow down requirements are a particular problem because of the way in which commercial programs are developed. In a commercial environment, the selection of sources and the acquisition process for raw materials, parts, subassemblies, and components is set in motion and often completed well in advance of the orders being placed by our commercial customers.
>
> The Government order for an airplane containing flow down requirements cannot, therefore, in many instances, be complied with after the fact by our vendors and suppliers.[14]

The same witness gave one specific example of the impact of this problem. He said, "Nineteen Federal Acquisition Regulation clauses, a list of which is attached, were identified by Boeing as requiring flow down, and in order to comply with all the government flow-down requirements, would have meant reopening and attempting to renegotiate approximately 3,900 vendor contracts, most of which had been in place, as I said, since the beginning of the program."[15] These clauses included such socially important statutory clauses as "Utilization of Small Business Concerns and Small Disadvantaged Business Concerns," "Utilization of Labor Surplus Area Concerns," "Certification of Nonsegregated Facilities," "Equal Opportunity," "Affirmative Action for Special Disabled and Vietnam Era Veterans," "Affirmative Action for Handicapped Workers," and "Clean Air and Water."

In its report concerning the hearings, the Congress divided the "burdensome clauses" problem for prime and subcontractors into two areas—those required by statute and those not required by statute or given much broader application by DOD than the statute required. The Senate report justified the need for those required by statute because benefits to achieving social and economic goals outweighed the added costs. It then sharply criticized the DOD for using those not required by statute or for giving broader application than required to statutory clauses. The Congress later directed DOD, in Section 824(b) of Public Law 101-189, the National Defense Authorization Act for FY 90 and FY 91 to "develop a simplified uniform contract for the acquisition of commercial items by the Department of Defense and shall require that such simplified uniform contract be used for the acquisition of commercial items to the maximum extent practicable."[16] It also required DOD to reduce the flow-down problem by restricting the clauses that a prime could flow down to a subcontractor.

The DOD then began a substantial effort to develop a simplified uniform contract for commercial-item acquisition. The following statutory parameters and basic principles utilized in developing a simplified uniform contract were taken from a DOD briefing in May 1990.[17]

a. Statutory Parameters
- — Only clauses required by law or regulation or essential for protection of the Government's interest
- — Flow down to subcontractors as above

- — Modified inspection clause for high quality producers offering warranties
- — Use standard commercial warranties
- — Revise cost and pricing data submission requirements

b. Basic Principles
- — Only performance specifications
- — Government may not specify details of design or manufacturing processes
- — Simplified inspection procedures
- — No in-process inspection
- — Minimal requirements for technical data/computer software
- — New commercial style tech data clause
- — No unilateral specification changes
- — Use commercial practices for:
- — Packing and marking
- — Quality Systems/Programs
- — Replace formal request for exemption from certified cost or pricing data requirements with simplified pre-award certification

Given these parameters and principles, DOD published DFARS 211.70 for public comments. The subsequent interim rule contained 136 provisions and clauses. Since many of these are used in "either/or" situations, all will not appear in every solicitation or contract. The typical solicitation will contain 54 to 111 provisions or clauses, and the typical contract will contain 37 to 78 contract clauses. Net flow-down requirements were reduced to 29 clauses. This represents a significant improvement to the typical fixed-price supply contract which normally contains more than 300 clauses.

The effort by DOD to develop a simplified uniform contract for commercial-item acquisition, combined with policies and procedures outlined in DFARS 211.70, is a substantial step forward in removing a major impediment to acquisition of commercial items. However, DOD was only able to solve a portion of the problem. Approximately 77 of the 136 provisions/clauses are required by statute or executive order. Many of these are the types of clauses that witnesses before the Senate subcommittee listed as impediments. The DOD did its part in fixing the problem. The Congress, however, was faced with a tough choice. It chose in favor of social policy. The CSIS study included the following:

> The problem is that the Congress cannot have it both ways. The congressional mandate for greater efficiency and effectiveness in government acquisition through greater reliance on commercial and NDI procurement cannot be achieved if commercial firms are unwilling or unable to sell commercial-type items to the government. And, while many of these regulations and laws were designed to protect the government or to enhance the societal benefits of defense spending, they are inappropriate to—and indeed were never intended for—the commercial marketplace.[18]

Sooner or later the Congress must admit it is part of the problem, and either accept the contractual limitations on acquisition of NDI due to congressional requirements or realize that commercial-item purchases by government agencies should be exempted from requirements of law that normally do not apply to contracts in the private sector for those commercial items. Social policy regulation still can be applied to the billions of dollars of contracts for noncommercial items. If the Congress is serious, it is time to take a step in the same direction that it has been pushing DOD on this issue. Only then will this impediment

to buying commercial items be essentially resolved.

CONCLUSION

There is universal agreement among industry, DOD and the Congress that major contracting-related impediments to acquiring NDI, particularly commercial items, exist. They arise primarily as a result of differences between the contracting philosophies of the government and private industry. Discussions concerning these issues have been extensive, and measures have been taken to reduce the impediments.

Congressional language in the House Armed Services Committee (HASC) report of the FY 91 National Defense Authorization Act, and subsequent endorsement by many in DOD have highlighted the benefits of utilizing the competitive proposals procurement method. Although not a new procedure, it is gaining more favor, given the current attention to "best value" contracting. Increased utilization of this approach will bring government and commercial contracting philosophies more in line.

As a result of public law, positive changes have been made to the FAR and DFARS. Government cost-accounting requirements have been examined. Changes include the increase in threshold from $100,000 to $500,000 and elimination of the requirement for certified cost and pricing data when only one response is received to a request for competitive proposals for commercial items. Other positive changes, as a result of public law, are the requirement for a simplified uniform contract for commercial item acquisition and the streamlining of flow-down requirements. These are positive steps removing some NDI acquisition impediments.

However, there has not been universal agreement regarding the real cause of contractual impediments to NDI acquisition. The DOD says problems arise as a result of micromanagement by the Congress through statute. The Congress says that DOD misinterprets its intent, and this leads to faulty implementation by the DOD through their regulations. This basic conflict between the legislative and executive branches may never by totally resolved. Impediments, such as socioeconomic provisions, will likely continue.

The differences in contracting philosophy reflect a greater difference in the overall acquisition philosophies between private industry and government. It is impossible to reconcile differences in the goals of maximum profits and growth versus welfare of the general public. Only through continued constructive dialogue between industry, DOD and the Congress can specific impediments be addressed and resolved to the maximum extent acceptable to all parties.

ENDNOTES
Chapter 6

1. DSMC, *Commercial Practices for Defense Acquisition Handbook*, p. A-2.

2. Director of Defense Procurement briefing, "Obstacles to Additional Procurement of Commercial Items by DOD," December 11, 1991.

3. 10 USC 2325(a), Preference for Nondevelopmental Items.

4. P.L. 101-510, "National Defense Authorization Act for Fiscal Year 1991," Section 802(d)(3)(A).

5. Report of the Committee on Armed Services, House of Representatives, "National Defense Authorization Act for Fiscal Year 1991," p. 300.

6. *Ibid*, p. 300.

7. *Ibid*, pp. 300-301.

8. CSIS, "Integrating Commercial and Military Technologies for National Strength - An Agenda for Change," p. 31.

9. "Federal Acquisition Regulation (FAR)," para. 15.804-3(c) and 30.201-1(b)(6).

10. Department of Defense, "Report to Congress on the Defense Industrial Base," November 1991, pp. 5-6.

11. "Defense Federal Acquisition Regulation Supplement (DFARS)," para. 211.7004(:).

12. *Ibid*, para. 211.7004(o).

13. Michael G. Kolchin, *Purchasing in the Industrial Institutional, Governmental, and Retail Sectors: A Comparative Study*, 1990, p. 33.

14. Hearings Before the Subcommittee on Oversight of Government Management, Committee on Governmental Affairs, United States Senate, "Oversight of DOD's Inadequate Use of Off-the-Shelf Items," pp. 15-16.

15. *Ibid*, p. 16.

16. Public Law. 101-189, "The National Defense Authorization Act for Fiscal Years 1990 and 1991," Section 824 (b)(2).

17. Deputy Assistant Secretary of Defense (Procurement) briefing, "Simplified Contract for Commercial Items," May 17, 1990.

18. CSIS, "Integrating Commercial and Military Technologies for National Strength - An Agenda for Change," p. 69.

Chapter 7
FINAL THOUGHTS ON NDI

In the previous chapters, we tried to define and discuss various aspects of NDI acquisition. They were based on written documentation, interviews and personal experiences; and any assertions or recommendations made were, hopefully, well supported. In this final chapter we want to express a few opinions based on our overall experiences this year but are not as easily supportable with hard documentation. In many cases our feelings were developed by bits and pieces taken from a variety of sources or from specific comments from people candid with us because they were promised their comments would not be quoted.

HOW IS DOD DOING IN REGARD TO NDI?

In our opinion, DOD is doing better. The Congress, OSD and the Services have turned up the gain on NDI during the last few years and the NDI concept is in place and being utilized. In terms of documentation, OSD published two specific manuals, SD-2, "Buying NDI," and SD-5, "Market Analysis for Nondevelopmental Items," and conducts a training course on buying NDI. The Services have augmented the DOD 5000 series manuals with Service-specific guidance on NDI, which also is being taught in acquisition specialty courses at the Defense Systems Management College and other locations. Each Service has acquisition "war stories" about NDI programs that have been very successful and some that have been less than sterling. The Army seems to be the most serious about strictly defining NDI programs and managing them as such. The Air Force and Navy are probably doing NDIs as well as the Army; but neither Service seems as focused on the NDI acquisition policy and process issues as the Army. To the Army's credit, it appears to be leading the Services in presenting hard evidence of their corporate initiatives for promoting increased use of NDI acquisitions. They appear to have a larger number of headquarters staff members associated with and working on NDI-specific issues.

Is there still room for improvement? Yes, we strongly feel there is room for improvement in current NDI acquisition processes and expansion of the NDI acquisition concept to a broader range of procurement programs. Today's defense budget and the international competition in which the defense industry must operate will dictate that DOD and the Services employ more NDI systems and components to satisfy requirements of soldiers, sailors and airmen who must use the equipment.

THE NDI CONCEPT

We feel that perhaps it is time to deemphasize the importance of "NDI" as a hard term in DOD acquisition and shift the concern to simply advocating the basic tenants of new starts as defined in DOD Instruction 5000.2. In addressing new-start acquisition programs, DODI 5000.2 says the Services should first attempt to use an existing or modified U.S. military, allied military or commercially developed system, fostering a nondevelopmental acquisition strategy. Only then can a research and development program, either in cooperation with an allied nation, another Service or Service-specific, be considered. The whole message here is not to develop

preexisting items or, if the Services can, modify items that meet the requirement.

These basic principles can apply to each and every level of program DOD initiates (Acquisition Category (ACAT) I, Non-ACAT, etc.), with the only variable being the degree to which they apply. Rather than deciding early if a program fits in the "NDI box" as defined by Congress or the Services and then applying a different set of rules to it, each program should be able to apply those rules to the extent that they can increase acquisition efficiency. Frequently a program is directed to be NDI right up front due to limited funding or, perhaps, because of the available funding appropriation type; and there are often other "political or programmatic" reasons why a program is driven to an "NDI strategy." The problem is that, once it is there, in most cases the program manager is constrained to keep his program in the "NDI box," even if it is more technically advantageous or cost efficient to break those boundaries. Many people we interviewed described numerous hours spent either keeping their programs clearly "NDI," even when the program was beyond the NDI concept, or trying to convince the establishment the program was still NDI, when it really wasn't.

Even in NDI programs, cost/performance trade-offs should be made. When it is smart to do a little development to get a lot more performance out of an existing system, it should be strongly considered. In fact, this does happen; but the research and development effort is not always advertised, leaving many smart decisions made in the interest of cost/schedule/performance unrecognized so that we appear to stay clearly within the "NDI boundaries." Countless hours are spent by acquisition professionals discussing whether or not a program meets "NDI criteria." So what—the important point is that the requirements are filled in a cost-effective manner following the hierarchy of options spelled out in DODI 5000.2 and that these options are applied as often as possible while going through as many layers of the system/subsystem/component hierarchy of a program as possible. Today, once a program is labeled "NDI," traditional acquisition rules and functional-area strategies are waived, tailored or deleted in the interest of efficiency when these smart ideas should be applied to any acquisition program, not just ones fitting the "NDI box." Do not give the program manager the burden of meeting the administrative or policy requirements involved in strictly defining the program type, instead give him the responsibility of efficiently managing his program. Challenge the program manager to make decisions on development vs. available technology throughout his program—whether the program is acquiring B-2 bombers or laptop computers.

Rather than making an "NDI strategy" decision up front, NDI acquisition concepts should be reviewed at each major milestone. We are not saying the Services should change the ways they are currently buying NDI; but we are suggesting that greater acquisition efficiency could be gained by broadening the definitional boundaries of NDI and applying good NDI acquisition concepts to a greater range of programs.

The current initiative of "zero base," as it applies to military specifications and standards, will help promote the use of NDI. Zero basing specifications will require that the Services justify the use of military specifications and receive approval for implementation of these unique specifications in acquisition proposals instead of using Commercial Item Descriptions (CIDs) or similar commercial performance specifications. To comply with this initiative, the Services must aggressively pursue the use of a detailed market analysis as a means of alleviating unique military

specifications to fulfill requirements which prevent high-tech and world-class suppliers from working in a smart or innovative manner. This failure to conduct these market analyses, including market surveys and in-depth market investigations, precludes the Services from gaining access to state-of-the-art technologies available in the commercial marketplace. The requirement, using the zero-base philosophy, to justify using the unique military specifications or standards should encourage the Services to use the market analyses to a greater extent than is currently employed in the procurement cycle. The result of this increased use of market analyses should be a greater application of existing state-of-the-art technology in military systems at more economical costs and with shorter development times.

The fact that the Critical Technology Lists of the Departments of Commerce and Defense have merged in the past years shows that the military acquisition agencies need to change cultural-based decisions regarding military equipment and the development of such equipment. The Services must recognize the applicability of dual-use technologies and the benefits of using these commercial-based items in military systems. To accomplish this, they must continue to educate the acquisition work force and the user communities in the advantages of not only NDI systems and components, but in all aspects of commercial products.

During interviews for this publication, we were made aware of an inconsistent level of knowledge in the lower echelons of the Services, particularly in the acquisition work force. The knowledge of these lower-echelon individuals is based on the cultural "this is the way it's always been done" attitudes or the "hands-on" training prevalent in the acquisition work force. On numerous occasions, we were able to label individuals as impediments to NDI acquisitions based solely on the individual's past cultural experience. The Services must break out of these "mind sets" to survive in these times of reduced budgets and increased oversight. The formation of career acquisition personnel is a first step. However, without adequate education, these professional acquisition individuals will fall prey to the same bureaucratic pitfalls that numerous acquisition initiatives, undertaken in the past to change the way DOD conducts business, have ended.

Throughout the course of this project, we have attempted to remain objective in regard to the information collected to support the findings. The Department of Defense does not need another review of directives and current regulations. The existing directives and regulations need to be made effective so the acquisition process can be properly executed. The Services do not fail to provide superior equipment for the defense of the nation or the nation's international interests, but they do fail in conducting acquisition in a business manner. The defense industry is shrinking rapidly as a result of world peace. However, the need for superior defense will never go away. The Services must recognize the unique position that they have placed themselves in because of their ability to procure the state-of-the-art technologies in the past. But, the Services also must recognize that this was in the past; and the world is changing. Therefore, it is up to the Services to change and grow; and now they must develop a means of continuing to procure state-of-the-art technologies within restricted budgets. To accomplish this, the Services must learn from their commercial counterparts how to conduct business in the marketplace.

Appendix A
Harvard University Case Studies

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Kennedy School of Government
Case Program

C15-88-806.0

Commercial Utility Cargo Vehicle

If you win by more than one vote, you've given away too much.
Lyndon Johnson

s

This case was written by Bruce I. Gudmundsson under the supervision of the National Security Program of the John F Kennedy School of Government, Harvard University. It was made possible by a grant from the Army Study Program Management Office. (0388)

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One of the explanations often given for the high cost of military hardware is the fact that many items of military equipment are designed expressly for military purposes and built in such small quantities that the Armed Forces do not benefit from the economies of scale that keep down prices in the commercial world. Unfortunately, the alternative, buying equipment "off the shelf," is not as easy for the Army as it might be for other customers. Army equipment must perform in an environment where the enemy is actively trying to destroy it and must therefore have certain peculiarly military features. Obtaining these special features while also taking advantage of the economic benefits of "off the shelf" purchase was the challenge faced by Major Lawrence Day of the US Army Tank Automotive Command when he was assigned to buy 55,000 commercial trucks for the Army.

Uncle Sam Owns the Drawings

Major Day found himself buying for an organization whose truck procurement policy had, in the past half-century, swung from one extreme to the other. In the early years of the motorized Army, trucks were bought "off the shelf" from commercial manufacturers. In time, the Army would come to commission the manufacture of vehicles designed expressly for its needs. Yet neither of these two methods of truck procurement ever won out completely. The story of the Commercial Utility Cargo Vehicle (CUCV)[1] would reflect both of these conflicting procurement impulses. The twists and turns of Army light truck procurement would lead from "jeeps," to "goats," to "pickups," and finally to the CUCV.

In the '20s and '30s, the Army had been so small (at times fewer than 100,000 men) and its budget so limited that it had no other option but to buy commercial trucks in small lots. When World War II broke out, the Army continued this practice. A wide variety of commercial vehicles were bought and shipped overseas. Modifications to make these vehicles capable of performing specifically military missions (e.g., gun mounts) were made in Army workshops.[2]

1 Pronounced either "cuck-vee" or "cut-vee."

2 In July of 1942, well after the auto industry had started to produce the hundreds of thousands of trucks ordered that, when current contracts ran out, the Army should only buy trucks using one of eight standard chassis. This policy, however, succeeded in standardizing only the 1/4 ton (Jeep) and 3/4 ton (Dodge weapons carrier) fleets.

Commercial Utility Cargo Vehicle **C15-88-806.0**

The cost of this policy did not become apparent until the Army got overseas. The combination of a large variety of models and a centralized supply system led to a maintenance nightmare. An inordinate percentage of the trucks that were sent overseas in both world wars lay idle for lack of spare parts—one officer writing in 1943 complained that in some units 50-75 percent of the trucks were not working because the spare parts needed to fix them were not available. Cannibalization—stripping of parts from one disabled vehicle to repair another—provided some relief. With over 330 types of wheeled vehicles and 260,000 types of spare parts for wheeled vehicles in the Army inventory, however, even cannibalization could not get the fleet rolling again. There soon developed a solid consensus in the Army in favor of a more standardized motor transport fleet.

After the war, the Army set about doing this. Vehicles were designed, often "from the ground up," to Army specifications. Special features, such as the ability to use a variety of fuels,[3] were added, and components that experienced unusual stress in a military environment (e.g., shock absorbers) were strengthened or even redesigned. Models were rationalized into a "family" of motor vehicles, so that the Army had only one type of vehicle for each purpose in each weight class.A key element in this policy was the Army's ownership of the data rights for all military vehicles. The Army even obtained the data rights to components that were almost indistinguishable from commercially available parts. The rationale behind this policy was that the Army did not want to be the prisoner of a single manufacturer. By owning the design of the complete vehicle, the Army could protect itself from the effects of a manufacturer changing designs between contracts, which, at that time, ran only for a year. By owning the design of the components, the Army could get competitive bids on spare parts production.

This system served the Army through the 1950s and 1960s and the custom-designed vehicles acquitted themselves well in the Korean and Vietnam wars, conflicts fought in countries with a shortage of paved roads and a surplus of difficult terrain. Standardization resulted in a number of significant improvements in what the Army calls "supportability"—the ease and economy with which a vehicle can be kept in good running order. Mechanics had only to learn how to repair, and drivers needed only to learn how to drive, a limited number of vehicles and thus could master their intricacies far more quickly than their civilian counterparts, who had to deal with a plethora of makes and models. Even the costs associated with writing, printing, stocking, and distributing technical manuals were reduced.

The most important improvement in supportability that was associated with the standardization of the military truck fleet was the reduction in the number of types of spare parts that the army had to procure, stock, and issue. Fewer types meant that the Army could buy spare parts in larger quantities and at lower unit cost. Fewer types also meant that spare parts inventory could turn over faster, further reducing the cost of supporting the truck fleet while ensuring that any particular part was available when needed.

3 The multifuel engine that the larger (e.g., 2 1/2 ton and up) military standard trucks carried could use various grades of gasoline, wood alcohol, and jet fuel, although diesel was the preferred fuel.

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Good Old Dodge

Even in the heyday of custom designed trucks, there were exceptions to the policy of government ownership of data rights. In 1950, the Army introduced, as the standard vehicle in the 3/4 ton class,[4] the M37 light truck, a modified version of the Dodge Powerwagon.[5] When it came time to buy additional M37s and spare parts, the Army, pleased with both the performance of the M37 and the prices charged by Chrysler Corporation, declined to solicit competitive bids. Instead, the Army entered into a "sole source" relationship with Chrysler. The Army was the only buyer of the M37[6] and Chrysler was the only producer In the course of the next sixteen years, the Army bought 105,000 M37s, plus innumerable spare parts, from Chrysler.

In 1964, however, this relationship aroused the ire of Congress. Kaiser Jeep Corporation, a firm that had a great deal of success winning contracts for the production of military standard vehicles, complained to the congressmen who had Kaiser Jeep plants in their districts that Chrysler's monopoly on military 3/4 ton vehicles was unfair to other auto producers. As a result, the Army canceled its contract with Chrysler and informed Congress that it would not purchase any more 3/4 ton vehicles under the arrangement "except in a genuine emergency.[7]"

While it set about deciding what kind of vehicle it wanted to replace the M37, the Army instituted a program to extend the life of its current fleet of M37s. Commercial contractors were asked to bid on a contract to rebuild high-mileage M37s. The contract was written in an unusual way. Rather than mandating, as some rebuild contracts do, that specified components be replaced or refurbished, it only required that the rebuilt vehicles perform to certain standards. Even though Chrysler was not in the rebuild business, it put in the lowest bid for this contract and won it. Rather than actually rebuilding the old M37s it received from the Army, however, Chrysler chose to fulfill the terms of the contract by replacing the worn-out vehicles with M37s fresh off the assembly line. These new vehicles were given the serial numbers of the worn out M37s and delivered to the Army.

Nothing Good Lasts Forever

ot satisfied with getting just another workhorse, the Army wanted to replace the M37 with not one but two vehicles with enhanced capabilities. In the late 1960s, the Motor Vehicle Requirements (MOVER) study recommended that the Army procure an extremely agile 5/4 ton vehicle to replace the M37 in front-line units,[8] and an exceptionally reliable 5/4 ton truck to replace the M37 in units further to the rear.[9] For the former purpose, the Army began to develop the

4 Military trucks are classified according to how much weight they can carry. A 3/4 ton truck can carry 1,500 lbs. of cargo. A five-ton truck can carry 10,000 lbs. of cargo.

5 The Dodge Powerwagon, ironically was a "civilianized" version of a weapons carrier that Chrysler had built for the Army in World War II.

6 Many of the M37s bought by the Army were subsequently resold to the Marine Corps, Air Force, and navy, as well as the armed forces of other countries.

7 For more information on this incident, see GAO report B-146921 dated 12 August 1964

8 In Army parlance "forward of brigade rear." That is to say, with units which must do a lot of moving across country.

9 "To the brigade rear." With units whose duties keep them on paved roads.

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Gama Goat, an unusual six-wheeled vehicle that was to have the hill-climbing ability of its namesake. For the latter purpose, the Army initiated the XM705 program.[10]

Although the XM705 would be limited to driving on paved roads and the occasional trail, the Army spent a great deal of money rethinking such work-a-day components as batteries and spark plugs so that it would require as little maintenance as possible. It was an unusual sort of "gold plating.[11] The Army couldn't ask for increased performance—a truck that could be driven at 150 miles per hour was of little use on roads designed for vehicles traveling 70 miles per hour. What it did ask for, however, was exceptional RAM-D (Reliability, Availability, Maintainability, and Durability).

Like many other programs that attempted to push the limits of technology, the XM705 program proved to be more expensive and time consuming than the Army had originally planned. To fill the gap between the aging M37 and the hoped for XM705, the Army procured an interim vehicle, the M715. Mindful of congressional distaste for even the appearance of sole source procurement, the Army wrote the specifications for the M715 quite loosely. All it wanted was a cheap pickup truck that would serve the Army for the six or seven years it would take to develop the XM705.

AM General, the division of American Motors that built both civilian and military Jeeps," put a pickup truck body on the chassis of a Jeep Cherokee and came in with the lowest bid, eventually selling 30,000 M715s to the Army. The Army was not as happy with the M715 as it had been with the M37, but it did not make much of a fuss. It had gotten exactly what it had asked for and, after all, the XM705 was just around the corner.

In 1971, Congress threw a monkey wrench into the Army's plans. Largely because of massive cost overruns, but also because both the development and production had been awarded to General Motors in a single source Total Package Procurement contract, an approach that had fallen into disfavor at that time, Congress canceled the XM705 program. Unless something was done, the Army would soon be stuck without a serviceable 5/4 ton truck.

The Army's first response to this crisis was another interim program. The XM852 was to be, like the old M37, a militarized version of a commercial vehicle. XM852, however, was fated to last less than a year. The program had hardly begun when Army policy was changed as a result of the WHEELS Study.

WHEELS

The M37 was not the only member of the Army's family of standardized trucks to get old. By the mid-70s, the trucks bought in the late '50s and early '60s would have reached the end of their service life and the Army would be faced with the "block obsolescence" of its military

10 The "X" stands for "experimental." Had the vehicle gone into production it would have lost the X and become the M705.

11 "Gold plating" is the tendency of equipment designers to build in expensive "bells" and "whistles" that provide only marginal improvements in the performance of the main mission of the equipment.

standard truck fleet. To deal with this impending crisis, the chief of staff of the Army, the senior uniformed decision-maker in the Department of the Army, convened a committee, known as the WHEELS[12] study group, to examine the entire truck fleet. The study group, in turn, commissioned the consulting firm of Booz Allen to study the pros and cons of a return to the use of commercial models in tactical units.

The chief argument in favor of acquiring commercial models was low "up front" costs—the Army would benefit from competition in an already well-established market and be able to buy commercial trucks for far less than military trucks. Counter-arguments revolved around the problem of supportability—the economies obtained by the standardization of military trucks in the 1960s might be lost. Commercial truck models changed every two or three years, making the stocking of spare parts, manuals, and special tools quite expensive and leading to a requirement for additional training for mechanics. The benefits of mass production, moreover, were only available in the light (3/4 to 5/4 ton) truck category, the size intermediate between a jeep (1/4 ton) and a medium (21/2 ton) truck. All three major American auto companies (General Motors, Ford, Chrysler) mass produced pickups and similar vehicles in the light category. (In 1971, the study noted, sales of such vehicles exceeded 1.6 million.) Heavier vehicles were made in much smaller quantities by a larger number of manufacturers that tended to heavily "customize" their products according to customer requirements.

The Booz Allen study report concluded that commercial vehicles made sense primarily in the light and the super heavy (e.g., tractor trailer) categories. It recommended that the Army cancel its efforts to design a military standard 5/4 ton truck and start buying commercial pickup trucks when the military standard 5/4 ton trucks then in use reached the end of their service life.

The Army took this advice to heart and immediately initiated a project, entitled XM880, to buy a commercial pickup truck. The XM880 project office was subordinate to the Light Tactical Vehicle Program Office,[13] the Army organization responsible for buying all sorts of light vehicles, from motorcycles to fully tracked arctic vehicles. Like the rest of Tank Automotive Command and a number of automobile manufacturing plants, the Light Tactical Vehicle Program Office was located in the Detroit suburb of Warren, Michigan.[14]

The Army Buys a Pickup Truck

The first step towards procuring a commercial vehicle was to find out what was available. In July of 1973, the XM880 project office bought twelve pickup trucks from five automakers and began to test them. The purpose of these tests was not to choose between the twelve models or even disqualify the least acceptable. On the contrary, the data drawn from the tests was used

12 Wheels like SOS, is one of those acronyms that has no long form.

13 This case study covers a time when Army agencies often changed their names. To prevent confusion, the organizations's current (1987) name is used.

14 The buildings that shelter TACOM's agencies and workshops are almost identical to those containing nearby the automobile plants. The TACOM complex can be distinguished, however, by the Pershing tank that is parked near the main gate.

to get the Army ready to support a commercial 5/4 ton fleet with parts, manuals, and mechanics.

Because of the outcry over the sole source procurement of the M37 and the attempted Total Package Procurement of the XM705, the Army was quite sensitive to even the appearance of discouraging competition in the XM880 program. The TACOM team that wrote the specifications for the vehicle reviewed dealer catalogs to ensure that each of the features that were to be required in the contract were offered by as many auto companies as possible. Some features that the TACOM team thought were desirable (e.g., heavy duty shock absorbers) were not included in the specification for fear of excluding one or two automakers from the bidding.

With this same end in mind, specifically military requirements were kept to an absolute minimum. Chromed parts, of course, were not acceptable on a military vehicle. Providing bumpers and windshield wipers painted green required no changes on the assembly line—the finishing of such items was done by the manufacturers of those items before they were shipped to the assembly plant. The special infrared sensor resistant paint that the Army wanted on all of its vehicles was compatible with the painting equipment then in use on commercial assembly lines, so its use would present an automaker with no additional headaches. Apart from these two changes, the pickup trucks bought by the Army would be identical to those bought by civilian customers.

Further customizing of the M880 vehicles was to be done by the Army itself. Troop seats, canvas covers, 24-volt alternators (for radio-carrying vehicles), special devices for an arctic environment, tie down brackets so that "camper" type shelters[15] could be installed and other items that were of interest only to military customers, were procured from third party vendors as modification kits. Army units which needed these special features were to requisition the modification kits from TACOM and have them installed in Army workshops or by local contractors.

On October 3,1974, TACOM announced its requirements in an invitation to bid. By February 24,1975, the four largest automakers—Ford, General Motors, Chrysler, and AM General[16] — had responded with their bids. Four days later, the Procurement Evaluation Board convened by the commanding general of TACOM determined that while the pickup trucks offered by all four manufacturers met the Army's requirements, the Chrysler D200 and W200[17] pickup trucks were the least expensive. A few months later, Chrysler began the task of painting green and delivering to the Army 33,759 of 200,000 pickups that rolled off its Warren Truck Assembly Plant that year. The XM880 became M880[18] and deliveries began early in 1976.

15 These shelters were usually used for communications and other electronic equipment.

16 AM General was formerly known as Kaiser Jeep.

17 The difference between the D200 and the W200 was that one had four wheel drive and the other had two wheel drive. To keep costs as low as possible, the Army decided to procure two wheel drive pickups for units furthest away from the battlefield.

18 Pronounced "em-eight-eighty."

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Truck Abuse

In the mean time, the all-terrain counterpart of the M880, the Gama Goat, was turning out to be something of a lemon. Because of this poor performance, the Army bought only 11,000 of the 31,000 it had planned to acquire to replace M37s in units that spent a lot of time away from paved roads. The M880, being the only available vehicle in the 5/4 ton weight class, was called upon to fill the gap. Additional vehicles were bought from Chrysler and the pickups soon found themselves driving in the kind of rough terrain that they had never been intended to deal with.

As a result of this additional stress, M880s in forward units broke down more often than had been anticipated. Transmissions first leaked and then wore out ahead of schedule,[19] brakes had to be repaired every 2,000 to 3,000 miles, and bumpers fell off. Electrical system components had to be replaced frequently and tune ups were required every 600 miles or so. Springs, axles, and shock absorbers wore out much faster than had been expected. Most alarming of all, however, was the tendency of the cargo bed to fall off the frame. The welding technique that had been acceptable in a commercial vehicle, it seems, had resulted in connections that were too weak to withstand the stresses of frequent off-road use.

This unreliable cargo bed also limited the strategic mobility of units equipped with the M880. The Army relies heavily on rail transport to move units from one end of a continent to the other. Unlike any other Army vehicle, M880s had to be emptied of any cargo before they were tied to flatbed railroad cars. Otherwise, the cargo bed would become distorted during "humping," the somewhat less than gentle process by which railroad cars are sorted in a railyard.

The problem of the weak bond between the M880s cargo bed and its frame was never solved. Other M880 problems were solved by more frequent maintenance, a solution that cost the Army a great deal of money and resulted in a full quarter of the M880 fleet being "in the shop" at any given time. Still other problems forced the Army to have its M880s modified. As had been the case with the initial modifications that "customized" various M880s, TACOM procured modification kits from third party vendors and units had them installed by Army workshops or local contractors.

The problems with the M880 made a lot of people in front-line units look forward to the day when the High Mobility Multipurpose Wheeled Vehicle (HMMWV)[20] reached the field. HMMWV was an all-terrain vehicle that the TACOM had intended as a replacement for the Gamma-Goats, M880s, and jeeps in front-line units: Unlike the M880, HMMWV was being designed "from the ground up" as a military vehicle, with some versions being earmarked for such combat missions as carrying heavy machine guns and anti-tank guided missiles. While a high percentage of HMMWV components were commercial in origin, the vehicle as a whole had no civilian counterpart. HMMWV, however, would not reach the field until the mid-1980s. In the meantime, the M880 would continue being abused.

19 In some cases after only 7,500 miles.

20 Pronounced "hum-vee."

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CUCV—the Mission

The HMMWV was far too expensive to use as a replacement for the M880 series vehicles then serving in rear area units. For that purpose, the Army decided to procure another vehicle—the Commercial Utility Cargo Vehicle (CUCV). CUCV was to come in a number of version—command vehicle, cargo truck, ambulance, communications shelter carrier, etc. While the bodies on these models would vary, they would all have the same engine and drive train. This scheme matched the industry practice of building both pickup and utility (e.g., Ford Bronco or Chevrolet Blazer) trucks around the same "guts."

Where HMMWV was ambitious, CUCV was to be modest. Its sole purpose was to move people and cargo around rear areas with reasonable economy and reliability. There was no "state of the art" to push and it was universally assumed that an "off the shelf" vehicle would do just fine. It was also assumed, however, that the CUCV would have to be different from the M880 in a number of areas.

CUCV would have to have better off-road mobility than the M880 because it was scheduled to replace many of the Army's military standard jeeps. Soon after the program began, Congress had mandated that 20 percent of the jeep fleet be replaced with "off the shelf" vehicles. Since procuring a separate "off the shelf" jeep would needlessly complicate the Army supply system and because the Army had decided to replace the remainder of the military standard jeeps with HMMWVs, CUCV was called upon to fulfill this congressional mandate.

CUCV would also have to be factory equipped with many of the specific military features that had been retrofitted to the M880 series vehicles after they had been delivered to the Army. The cost of adding such features as black-out lights, lifting shackles,[21] and 24-volt electrical systems to M880s had almost equalled the cost of the vehicles themselves. Needless to say, the Army was eager to avoid such expense in the future by making these features "factory installed options."

Execution

Getting these extra capabilities without sacrificing the competitive "off the shelf" nature[22] of the procurement was the main challenge that Major Lawrence Day faced when he took over as weapons systems manager (WSM)[23] for CUCV. Day's previous assignment had made him quite familiar with the problems of the M880 series[24] and after reading the after action-report

21 These items, which are present on all military trucks, enable the vehicle to be towed by a military standard tow truck.

22 That is to say, while ensuring that there were at least two manufacturers to compete for a bid.

23 A weapon systems manager plays a role analogous to that of a program manager. The major difference is in the size of the system being procured.

24 Before reporting for duty at TACOM, Major Day had served in Germany as the maintenance officer of POMCUS site—a warehouse complex full of equipment that, in case of war, would be used by soldiers flown in from the United States. One of his duties at this warehouse complex was to ensure that all required modifications were performed on the large numbers of M880s that were in his care.

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of the WSM for M880—a report that confirmed his belief that the M880 had not performed well in rough terrain—he set about finding what was available on the market.

Working out of his office in Warren, Day would have to choose among the parts and models offered by the very manufacturing plants that surrounded his building. At the same time, however, he would have to cope with the divergent demands of a myriad of Army agencies located around the country.

Day first researched dealer catalogs to get an idea of the range of options available to him. He was pleasantly surprised to find that in the decade that had passed since the initiation of the M880 program, commercial light trucks had been acquiring features that made them suitable replacements for the venerable jeep. Army civilian Jim Christensen, who participated in drafting the list of desired requirements for CUCV, attributes this to the development of a civilian market for light trucks with an off-road capability. According to Christensen,

> *The recreational vehicle market was causing the manufacturers to put larger, more aggressive tread tires on their commercial trucks. The recreational vehicle market was also saying that it needed more suspension travel, locking differentials, undulation for the axles and suspension all features that enhanced off-road mobility.*

To test the value of these features, Day purchased 26 commercial trucks for what he called "feasibility/suitability testing." The trucks were shipped to the Army's Aberdeen Proving Grounds in Maryland, driven over 10,000 miles each over a standard rough terrain course under a variety of conditions, and had various components tested for capacity.

In the course of these tests, Day discovered that commercial vehicles in the 5/4 ton class in fact differed extensively from one manufacturer to the other. Some pickup trucks, for example, could barely carry 2,500 pounds of cargo while those of other manufacturers could easily carry 10-20 percent more. The difference in capacity lay in the performance of components such as springs and shock absorbers. As a result of this discovery, Day decided that he would have to depart from the acquisition philosophy used in the M880 program. In addition to specifying the performance characteristics for the vehicle as a whole, he would specify the characteristics of certain key components and sub-assemblies.

Roger Gay, a civilian engineer working at TACOM in direct support of Day's effort, concurred with this approach. The economies of scale enjoyed by many civilian industries, Gay notes, were obtained at the subcontractor level as well as on the assembly line.

> *A certain type of clamp used on the military standard jeep costs 60 cents each. Similar clamps on a civilian vehicle cost less than one-half of 1 cent each. The difference is that while the military buys 10,000 of the jeep clamps a year, the automakers buy millions of the civilian clamps.*

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Setting Requirements

While Day played a role in setting the requirements for CUCV, the decision as to what characteristics CUCV was to have was not his alone. In the Army, writing requirements for military equipment is primarily the task of the "user community"—the representatives of the people who will actually use the CUCV. In addition, a large number of special purpose agencies had a say in the determination of the requirements for CUCV. Day's role was, to use his own word, that of a "broker" who reconciled the desires of these agencies with each other and what he knew was necessary to make the vehicle a success.

An indication of the complexity of this task can be gleaned from the following passage from the Army's official Material Acquisition Handbook. It lists the agencies that must be consulted prior to the publishing of the final draft of the definitive list[25] of the required characteristics of a new piece of equipment.

> *The TRADOC proponent will distribute the first draft document to HQ TRADOC (ATCD-E),*[26] *HQ AMC (AMCDE-PA), TRADOC Integrating Centers [(CAC (ATZL-AM), LOGCEN (ATLC-M), Soldier Support Center (SSC) (ATSG-DDM), and SSC National Capitol Region (NCR) (ATZI-NMM)], other interested or affected TRADOC centers or schools, the proponent or other interested or affected AMC MSC's, the primary gaining MACOM, Military Traffic Command-Logistics Evaluation Agency (LEA), the primary tester and evaluator, Nuclear and Chemical Agency (NCA), HQDA (DAMO-FDR).... A response is required from these addressees.*

Happily for Day, few of the requirements presented him with any real problems. He had been aided by a behind the scenes effort by what was informally known as the "truck community"—Army civilians who habitually worked on truck programs in the various agencies that would be dealing with the program. Over the years, these people had developed a good working relationship with each other and a considerable degree of expertise in the field of writing requirements for trucks. As a result, Day found few requirements imposed upon him that could not be fulfilled from the option catalogs of any one of the four major automakers.

This policy was made easier by the existence of the High Mobility Multipurpose Wheeled Vehicle program. Every time someone submitted a requirement that CUCV have a feature that was not readily available commercially, the truck community would steer him in the direction of the HMMWV, which had been custom designed for the Army as an extremely rugged combat vehicle. For example, when the Infantry School at Fort Benning asked that CUCV be made "parachute proof," a modification that would involve the complete redesign of the frame, the truck community advocated that the entire 82nd Airborne Division, the only unit in the Army that needed this capability, be equipped entirely with HMMWVs. According to Jim Christensen, doing this was quite easy. "The representative of the soldier in the field, be he from the Field Artillery School, the Armor School, or the Infantry School, preferred the HMMWV anyway.[27]"

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25 For a program like CUCV, this is known as the "Operational and Organizational Plan."

26 The letters in parentheses are office codes within the organization whose acronym precedes the parentheses.

27 There were other instances where the existence of HMMWV relieved Day of the burden of having to modify the

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Preserving Competition

Ensuring that CUCV components were compatible with the options already offered by automakers was a high priority for Day. The more competitors there were, the better were his chances of getting a low bid. A far higher priority, however, was getting a vehicle that met the needs of the soldier in the field. For example, the battlefield advantages of a diesel engine[28] were far greater than the danger of alienating a potential bidder.

In 1981, while Day was testing light trucks at Aberdeen Proving Ground, all four automakers announced that they planned to offer diesel engines as an option for all of their 5/4 ton vehicles for the 1983 model year. Soon thereafter, however, Chrysler decided to postpone the introduction of a diesel engine until well after 1983. In spite of this change in the marketplace, Day kept the requirement that all competitors for the CUCV contract offer a diesel engine for all versions.

In addition to not offering the right sort of engine, Chrysler fell short of another Army requirement. As a result of his experience with the M880, Day had promulgated a requirement that the cargo bed of any pickup truck competing in the CUCV program be securely bolted to the frame of the truck. The Chrysler competitor, a slightly updated version of the D200 and W200 vehicles that had won the M880 competition, had a cargo bed that was attached to the frame by the same process that had proven so unsatisfactory in the M880.

Ford Drops Out

The number of potential CUCV makers was further reduced by Ford's decision not to compete for the contract. Ford had suffered serious losses in the recession of the early 1980s and had decided to return to the manufacturing approach that had made Henry Ford famous. It was going to produce less expensive vehicles by reducing the number of options and hence the complexity of the manufacturing process. This approach was fundamentally incompatible with the Army's desire to "customize" CUCV from already existing manufacturers' options.

Ford had the engineering expertise, for example, to put a diesel engine in both the pickup and utility versions of its light truck. Because these vehicles were built on separate assembly lines, however, and because customers in the commercial market were willing to buy many diesel pickup trucks but relatively few diesel Broncos, Ford was unwilling to consider putting diesel engines in the Broncos, vehicles similar to the trucks General Motors and AM General were offering as candidates for the utility version of CUCV. It was not that Ford did not want to do business with the government—the company made an unsuccessful attempt to get the Army to accept a bid for the pickup versions of CUCV only. Ford was nevertheless unwilling to change

CUCV specifications to meet the requirements of the Army agency. Because of HMMWV, Day didn't have to ask manufacturers to cut holes in the roofs of their cabs in order to allow certain Army units to mount ant-aircraft machine guns.

28 At present, all Army motor vehicles, with the exception of motorcycles, and older vehicles being phased out, use diesel fuel. Having a fuel system that only uses diesel cuts down on the expense and complexity of that system and makes it far less vulnerable to enemy action.

its carefully calibrated manufacturing process to meet the needs of such a small share of the total light truck market.

Melvin Burcz, a TACOM civilian executive who supervised much of Day's work on CUCV, notes that Ford was not even willing to consider minor changes in its option list to satisfy Army requirements. "Ford wanted to sell us vehicles with chrome plated bumpers. Their position was, we won't change anything for you."

Paint

Ford's decision not to bid on CUCV left Day with two potential manufacturers—General Motors and AM General. Both companies were quite willing to add to their range of options to accommodate the Army's wishes. AM General even obtained a diesel engine from a third party in order to be able to compete. Both companies, however, were disturbed by one seemingly innocuous requirement—that CUCV be coated with a chemical agent resistant compound (CARC) paint.

The Army had long required that its equipment be painted with paint that would not absorb certain poisonous gases that were known to be in the Soviet arsenal and, moreover, would not be removed by the caustic cleaners used to decontaminate equipment exposed to poison gas. The Army Agency that served as the advocate for this requirement (in Army parlance, "the proponent") was the Belvoir Research Development and Engineering Command (BRDEC)[29] at Fort Belvoir, Virginia. Although BRDEC's requirement was phrased as a performance specification (i.e., "the paint must resist absorption of such and such agent under such and such conditions"), BRDEC retained the right to judge for itself whether or not a type of paint met that requirement. Until late 1981, only one paint, a polyurethane paint, had been qualified by BRDEC and it was widely assumed in the Army that CUCV would be painted with polyurethane.

Using polyurethane paint on some of the cars on an assembly line, however, posed a serious problem for both General Motors and AM General; it was incompatible with the acrylic coating used to finish commercial vehicles. According to TACOM's Roger Gay, "One microscopic drop of polyurethane paint on a vehicle being painted with acrylic would ruin the entire paint job."

While AM General, an experienced Army contractor with a far smaller market share than the other three automakers, expressed its willingness to convert to polyurethane, General Motors had a different idea. It suggested to Day that the acrylic coating already in use might meet BRDEC's performance specifications. Day, in turn, asked BRDEC to run some experiments on paint samples provided by General Motors. A few days later, only weeks before the formal bidding process was to begin, BRDEC announced that General Motors' acrylic paint would indeed resist both absorption of Soviet chemical agents and washing with caustic cleaners.

From the Army's point of view, the acrylic paint still had a few drawbacks. It was difficult to "spot paint" or paint over in the field. Nevertheless, once the essential requirement had been

29 Pronounced "bra-deck."

met, Day was willing to compromise on the "nice to have" for the sake of lower costs and competition.

The Bid

In January of 1982, Day's requirements for CUCV were formally promulgated in the form of a Two Step Invitation to Bid. Step One solicited manufacturers to qualify themselves by proving that they could meet Day's requirement—including the diesel engine, the bolting of the body to the frame, and CARC paint. General Motors and AM General were the only two companies that responded to Step One. Both companies passed muster and were qualified.

In June of the same year, Step Two invited the two qualified manufacturers to submit bids. General Motors submitted the lowest bid and on the 13th of July, 1982, won the contract, edging out AM General by one half of one percent.

Testing

The vehicles with which General Motors won the contract were variations of the Jimmies and the Blazers, that the company offered for the commercial market. Twelve of these trucks were produced with the Army's options and submitted to the Army for testing. At the Aberdeen Proving Ground, a number of small defects were found in the vehicles. The roof over the cab, for example, was found to leak in the rain. This had not been discovered on the commercial models because the upholstery used on the ceilings of those cabs trapped the infiltrating water so efficiently that commercial customers remained ignorant of the problem.

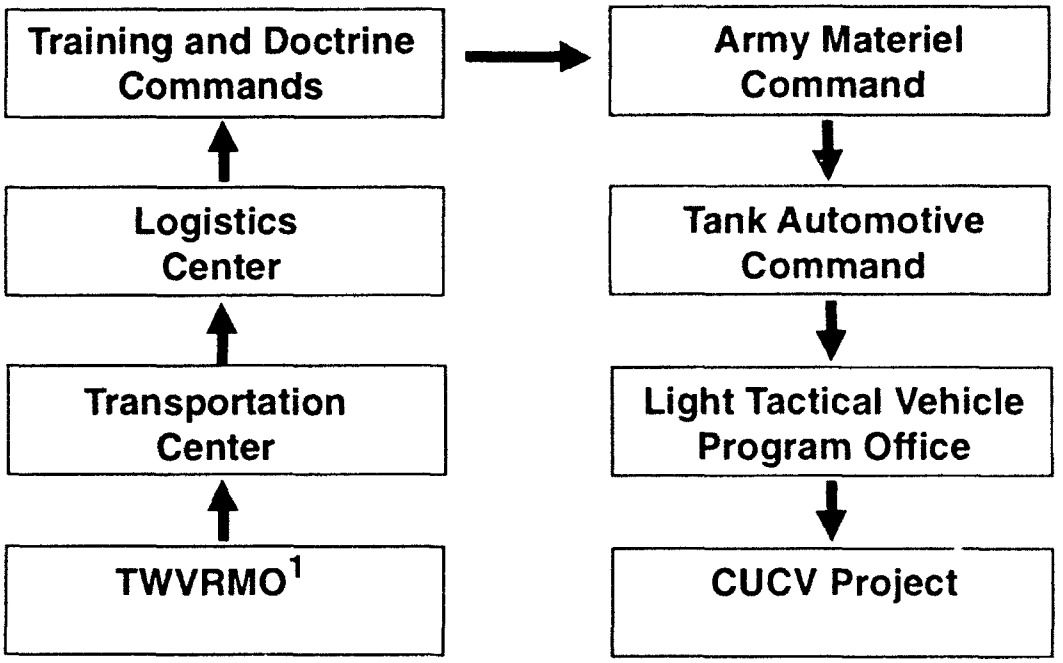
When these problems were reported to General Motors, changes were immediately made to the production processes used to make all of the Jimmies and Blazers, not just those destined for the Army. TRADOC's Jim Christensen credits General Motors with being more responsive "than most military standard manufacturers." With this obstacle overcome, the Army gave General Motors the go-ahead to start producing its first batch of 55,000 CUCVs. The first Army CUCV rolled off the assembly plant on 23 August 1983.

CUCV is currently in service with the Army, Navy, and Air Force, where it is popular with both the troops who use it and those who maintain it. Now that the current five-year production contract has expired,[30] however, the Army will be hard pressed to repeat its success with CUCV. In an effort to compete with small Japanese pickup trucks, all four US light truck makers have downsized their products, producing vehicles that are too small to meet the Army's needs. The GM assembly plant that produced CUCV was the last American production line to produce full-sized light trucks.

30 This case was written in 1987.

Appendix 1

Formal Flow of Requirements for the Commercial Utility Cargo Vehicle



1. Tactical Wheeled Vehicle Requirements Management Office

Appendix 2

CUCV Lexicon

BRDEC. Belvoir Research, Development, and Engineering Center. An Army R&D organization that develops equipment for combat engineers. It is also the proponent for CARC paint. Located at Fort Belvoir, VA.

CAC. Combined Arms Center. Fort Leavenworth, Kansas. One of the four TRADOC Integrating Centers. Its mission is to ensure that weapons and tactics developed by the Armor, Infantry, Field Artillery etc. Schools and Centers are compatible with each other.

CARC. Chemical Agent Resistant Camouflage. A type of paint used by the Army to protect equipment from the effect of chemical agents (e.g. poison gas).

HMMWV. High Mobility Multipurpose Wheeled Vehicle.

HQ AMC. Headquarters, Army Material Command, 5001 Eisenhower Avenue, Alexandria, VA.

HQDA. Headquarters Department of the Army.

HQ TRADOC. Headquarters, Army Training and Doctrine Command, Fort Monroe, VA.

Integrating Centers. Four TRADOC agencies that coordinate and integrate the work of the Schools and Centers and other TRADOC agencies.

LAPES. Low Altitude Parachute Extraction System. A means of dropping cargo and vehicles from a very low flying (2-10 ft above the ground) aircraft.

LOGCEN. Logistics Center. Fort Lee, VA. One of the four TRADOC Integrating Centers.

M561. A 6x6 1114 ton high mobility vehicle known as the Gama Goat.

M880. A Dodge W200 (4x4) pick-up truck bought "off the shelf" by the Army in 1976-1977 as a replacement for the M37 and the M71 S. Vehicles with the numbers M880 to M886 are four wheel drive Dodge pickups customized by the installation of various standard kits. Vehicles with the numbers M890 to M893 are based on the Dodge D200 two wheel drive pickup truck.

M881. A M880 series pickup truck with a 60 AMP electrical system retrofitted.

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M882. A M880 series pickup truck with a 60 AMP electrical system and communications installation kit retrofitted.

M883. A M880 series pickup truck with a 60 AMP electrical system and communications shelter tie-down kit retrofitted.

M884. A M880 series pickup truck with a 100 AMP electrical system and communications shelter tie-down kit retrofitted.

M885. A M880 series pickup truck with a communications shelter tie-down kit retrofitted.

M886. A M880 series pickup truck used as an ambulance.

M890. A two wheel drive M880 series pickup truck used for carrying cargo or troops.

M891. A M880 series pickup truck with a 60 AMP electrical system retrofitted.

M892. A M880 series pickup truck with a 60 AMP electrical system and communications installation kit retrofitted.

M893. A M880 series pickup truck used as an ambulance.

M1008 and M1009. Cargo carrying versions of the Commercial Utility Cargo Vehicle (CUCV), a militarized version of the Chevrolet Blazer.

M1010. An ambulance version of the Commercial Utility Cargo Vehicle (CUCV), a militarized version of the Chevrolet Blazer.

M1028. A shelter carrying version of the Commercial Utility Cargo Vehicle (CUCV), a militarized version of the Chevrolet Blazer.

MACOM. Major Command.

MERADCOM. Mobility Equipment Research and Development Command. Now known as the Belvoir Research, Development, and Engineering Center (BRDEC), a R&D organization that develops equipment for combat engineers. It was formerly known as the Mobility Equipment Research and Development Center.

NCR. Soldier Support Center, National Capitol Region. One of the four TRADOC Integrating Centers.

RAM-D. Reliability, Availability, Maintainability, and Durability.

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SSC. Soldier Support Center. One of the four TRADOC Integrating Centers.

STE/ICE. Simplified Test Equipment/Internal Combustion Engine. A computerized diagnostic system for Army vehicles.

TRADOC. U.S. Army Training and Doctrine Command. The Army agency responsible for determining what weapons the Army will need in the future. TRADOC also runs the Army's school system and writes training and tactical manuals. TRADOC Headquarters is located at Fort Monroe, VA.

TRADOC Proponent. An agency within TRADOC that originates lists of requirements for a particular weapons system. For example, the proponent for a new tank is usually the Armor School and Center while the proponent for a truck is usually the Transportation School and Center.

TWVRMO. Tactical Wheeled Vehicle Requirements Management Office. (Pronounced "twivermo"). An office subordinate to the Army Transportation Center and School at Fort Eustice, VA. Its job is to determine, on the basis of input provided by TRADOC's "Centers and Schools" (e.g., Infantry Center and School, Ft. Benning, GA; Armor Center and School, Ft. Knox, KY), the Army's requirements for trucks and similar vehicles.

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Military Contracting: Getting Out of the Business

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By any standard, the Department of Defense is a big spender. And big spenders, businessmen know, make good customers. Yet, paradoxically, companies with access to this vast market are rushing to get out of the business.

In 1982, more than 138,000 United States manufacturing firms sold products to the Department of Defense. Five years later, fewer than 40,000 companies were filling military orders.[1] Most of the 80,000 companies that closed out their military contracting are reported to have simply "opted for more reasonable customers.[2] This trend, analysts argue, portends a serious erosion of the nation's vital defense industrial base.

One company for which the Defense Department seemed to promise a bonanza of new sales was The North Face, a Berkeley, California manufacturer of high quality, technically advanced, camping equipment, including backpacks, tents and sleeping bags. Used to customers that buy in ones and twos, Defense Department orders for thousands of items at a time put stars in the eyes of the company's marketing executives. But the company's military work also came with its share of drawbacks. Working for the government disrupted the production of The North Face's commercial products; workers were left idle or laid off; and government designs were difficult to satisfy, but hard to alter. After 14 years of experience with the military, the company had a mixed track record of successes and failures, of profits and losses.

On May 9, 1988 a foreign textile firm, Odyssey International, would purchase The North Face and almost immediately face a decision about whether to continue the Berkeley operation's military sales. Odyssey would make its decision based largely on the advice of North Face executives, many of whom had experienced the ins and outs of defense contracting from the time of the company's first such sales.

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1 During this same period the defense procurement budget increased from $54.9 billion to $87 billion (FY 89 dollars). See Deterrence in Decay: The Future of the US Defense Industrial Base, The Center for Strategic & International Studies, Washington, D.C. 1989.

2 James Blackwell, senior fellow, Center for Strategic & International Studies in *Military Forum*, May 1989, P. 47.

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The North Face

A mountain's north face, as climbers know, presents the greatest challenge to those who seek to reach its peak.[3] The north side receives the least sun, therefore retaining more ice on, and cold within, its rock. Believing its equipment should live up to the harshest of environmental rigors, the people who founded The North Face named their new company accordingly.

The North Face started, in 1968, with less than two dozen employees and four sewing machines. The company was started by backpacking enthusiasts who saw a need for, and thought they could make, better gear. In time, the hikers and climbers who started The North Face turned into business people. Nineteen years after it began, the company had grown into a $55 million-a-year company with 1,000 employees. In the interim, the Berkeley company became known as a producer of extremely high-quality products. "We saw our niche in fully warranted goods that would last forever," Kenneth (Nap) Klopp told Sales & Marketing Management[4] in 1978, when he was the firm's president. The company sold these goods through retail outlets in California,[5] and across the country.

Although The North Face grew tremendously from its beginnings, it never lost the flavor of its origins in the counter culture. In the 1960s, a visible segment of the camping community was decidedly liberal, politically and socially. The North Face reflected this culture, as did the city it called home. "Berkeley," *The Wall Street Journal* noted in a front page story about the city, "earned its reputation in the turbulent '60s as a crossroads of the counterculture and a kiln of the free-speech movement." Today, the *Journal* adds, the city continues "to march, organize, protest, meditate and stir its yogurt (organic, of course) to a different drummer.[6]

The North Face has changed with the times, yet even today the executives who pedal in or drive up to the company's Harrison Street headquarters are not the normal corporate types, who might as easily sell paint as parkas. Inside the company's airy, sunlit offices, where geodesic tents hang from the wood-beamed ceiling and the walls hold six-foot tall posters of skiers in flight, most employees exude the ruddy glow of the outdoors, where they actively use the equipment they sell. For the director of sales, lunchtime was an opportunity to sailboard on the bay, while others don Lycra riding suits and mount trail bikes for a quick spin.

One element of Berkeley culture has always been anti-militarism. As a product of that culture, it is unlikely The North Face would ever have made a conscious effort to become a military contractor. Instead, the company found itself gradually slipping into the role, "by accident and probably against our better judgement," according to Jack Gilbert, who held a variety of positions during almost two decades with the company. At first, in the early 1970s, came non-military government orders. The Forest Service, the Bureau of Land Management, the Interior Department and other federal agencies, with a need for the kinds of outdoor equipment the

3 The situation differs in the southern hemisphere.

4 p. 58.

5 Some of which it owned.

6 January 11, 1989.

company was known for, placed orders. The orders came from "people that were probably backpackers in their own right and... [who] wanted something that was a little more current and up-to-date" than the standard-issue equipment of the day, says Bill Werlin, who was then director of special sales at the company. "A couple of people, I think, called me once or twice and said, 'Look, I can buy these things on an individual ... p.o. [purchase order] or something, but I want to outfit my crew.... You guys need to get a GSA [General Services Administration] contract,"' Werlin recounts. "I'm sure that's what got me started on this thing."

The Promise of Military Contracting

Military sales not only augured well for an unlimited source of revenue, they promised to benefit the company's commercial production too. The company hoped that the defense work would fill out the troughs in its see-saw production schedule, provide field-test data helpful in developing its product line, and cushion the bottom line during hard economic times. "See, we have a seasonal business, so there's half the year we need one-and-a-half factories," Bruce Hamilton explains. "The other part of the year we need less than one. So,.... the idea was to try to get a load on the factory in your off season.

Selling its goods to the military looked like it could also benefit The North Face by providing free information on how its designs fared under extreme weather conditions and harsh use, since the services conducted rigorous evaluations of prospective purchases. The data from these service evaluations promised to improve the development of the company's commercial product line.

Becoming a Defense Contractor

The North Face received its first military contract without much effort. In about 1974, the US Army asked The North Face to bid on a contract for what turned out to be a total of 10,000 sleeping bags, according to Gilbert. "We knew we knew how to make lightweight sleeping bags so we said, 'OK, we'll look at this,"' he says. "I think this was the first [military] business."

It was not an auspicious beginning. Although it appears the company, then growing at the rate of 100 percent every six months, won a contract for two different types of bags,[7] built to specifications established at the Army's Natick Research, Development and Engineering Center in Massachusetts. What remains clear in the minds of those who were there at the time is that Natick wanted sleeping bags much different from any The North Face was accustomed to manufacturing. "The government's idea of a functional cold weather sleeping bag, and ours, were diametrically opposed," says Gilbert. The bag described in the specifications was based on an old design, and included heavier fabrics for durability, and a process for treating the down filling that Gilbert says made the feathers brittle.

It fell to Dan Castner, then just starting out with the company, to translate the military specifications into a goose down and polar guard bag. Castner concedes he "had no idea of what a

7 The contract was for 5,000 intermediate cold bags and 5,000 extreme cold bags.

government contract was." To learn, he attended night school. "We thought we could do it," he says, adding:

> *But to run a government contract takes more than just sewing. And that's what we found out. We had nobody in house who had any experience.... And we just completely blew it. Because there are these processes that must be met, all these steps. You have to have documentation.*

As a result of the company's inexperience—not knowing, for example, what paper work had to be completed as individual steps in the production process were finished—its first military sale was a loss.

The North Face's next defense contract, in 1979, turned out much better, and led company officials to believe they could make a profit in this line. In this instance The North Face was asked to be a subcontractor to H. Koch and Sons, (pronounced "coke") of Anaheim, California, then a division of Gulf & Western. H. Koch was developing a compact, vacuum packed cold weather survival kit to be fitted to aircraft ejection seats, and wanted The North Face's participation to provide the sleeping bag component. "When you crash and you live, and you need to stay warm, you pop open the bag and it's a 30 degree below zero down sleeping bag," says Lee Turlington, who was soon to be in charge of military sales. H. Koch, which had developed the vacuum packing technology, turned to The North Face to supply 400 sleeping bags. Able to use their own design, and now presumably wiser about government regulations, company executives thought they would fare better with Koch.

In retrospect, the company's first two military sales were object lessons in where the North Face would succeed, and where it would meet its most intractable problems, in military contracting. The crucial difference was this: in its initial sale it bid on a contract that bound it to an all-

encompassing set of military specifications; in the second instance the company had only to make sure that the vacuum packed bag, built to its own specifications, would perform satisfactorily. After H. Koch vacuum packed bags, Natick engineers ran a series of tests to determine if the product met its performance specifications. The Army evaluated the plastic packaging in an altitude chamber, to determine if the brick-like package expanded in excess of on-half inch at an altitude of 20,000 feet. The sleeping bag, in turn, was unpacked and unfolded, then put around an electronically controlled copper mannequin to determine if the bag had retained its insulating capability. "So now you've had the bag doing just what it's supposed to do in the field," says Neil Smedstad, Chief of Natick's Life Support Clothing and Equipment Systems Section. "That's the performance characteristics."

Building a product to meet a design specification was a disaster; meeting a performance specification, which meant building the product as the company saw fit, was much like making a commercial product. The latter may have even boon profitable. Some people who were with the company in the 1970s say building the vacuum packed bags was profitable, others that it was a financial wash. In either case, these initial forays into military contracting were an in-

vestment, believes Bill Werlin. The military market was enormous and Werlin, who was in charge of marketing, had his eye on the follow-on orders. Werlin says he saw "this big bonanza on the horizon," for additional vacuum packable bags, and concedes he grew rather starry eyed over the prospect of filling other military orders.

This investment did not pay off in the short run. The North Face failed to win an order to manufacture a larger quantity of vacuum packable bags. According to Smedstad, another company "underbid them tremendously and I won't mention the company's name, but I've had trouble with him ever since." Nonetheless North Face continued to pursue other military business.

Over time, military sales took on ever more importance for the Berkeley firm. A variety of relatively small orders, including some foreign military sales, continued to come the company's way. Because these orders were for off-the-shelf products, items (with minor modifications) that the company produced for the commercial market, i.e., no military specification-the business was profitable. "A couple of hundred units here, a thousand units there, a couple thousand units there, it adds up, and we were able to find a way to make money on it," concludes Turlington. And, as always, there was the prospect of ever more sales.

Some of the company's management felt encouraged enough by these limited successes, and the vast potential, to gear up for additional defense work. The company president, Hap Klopp decided to hire someone with expertise in military contracting and to give that person responsibility for this growing segment of the business. In so doing Klopp provoked a memorable internal debate.

Company management with anti-militarist sentiments now could no longer ignore that they worked for a military contractor. "At the time, there was a great deal of internal dissension about allocating resources to go after that business," Turlington says, referring to the new position Klopp created. "There were a couple of afternoons," Werlin adds, when "we sat around and said, 'Geez, guys, all of a sudden here we're working hard with the military. What's going on? Can we justify this?'"

In addition to the philosophical doubts company executives harbored against the military, not everyone believed that military business was the golden goose that the marketing department sometimes envisioned. Bruce Hamilton, in particular, who was director of manufacturing at the time, and later became president of the company, tried to spell out his doubts. He argued that to be successful as a military contractor the company would need to adopt a completely new business plan, one that involved opening a separate plant dedicated to military work, located in an area that would afford lower overhead costs. As it was structured, the company would "never be competitive on a government bid situation," he maintained.

Hamilton's position did not prevail. "You win some, you lose some, and then ultimately you say to yourself, I might be wrong too," he says. "I made my case, and if this is the way the company's going, well let's see if we can do it...." Given the company's declining profits during

this period, the lure of the armed services' multi-million dollar appetite for outdoor equipment was too compelling for many of the senior management. The philosophical objections, meanwhile, were finally dispelled with the argument that if American troops are going to fight, they shouldn't risk exposure to the cold for lack of the best outdoor equipment, which, at any rate, was in another moral league front actual weapons production.

Ready to forge ahead, The North Face hired a former Army officer with an MBA and engineering degree, Raymond Caughron, to coordinate military sales. Caughron "felt that the volume of [military] sales available to us was very significant," remembers Jeff Kohr, the company's chief financial officer. Sales that had been in the neighborhood of $1 million a year, he added, "could be a five, six, seven million dollar business to us. And it had the potential of even being more than that."

Cold Weather Shirts and Bib Overalls

Caughron believed that producing cold weather clothing for the military was one way to tap into this market. About five years before Caughron joined The North Face, the Army and the Marines had begun an effort to update their soldiers' 1950s-era cold weather clothing, with the goal of making the garments 30 percent lighter. Rather than design the clothing from scratch, the Army, which took the administrative lead in the acquisition, was in the market for commercially available garments. "By looking at commercial items," says Smedstad, "it's an easier and faster way to develop and field items to the soldier, and it's less costly to the taxpayer."

The Life Support Clothing Section at Natick was looking for a two-piece garment, known as "cold weather shirts" and "bib overalls." Both were to be knitted polyester, fiber pile garments under which soldiers would wear polypropylene underwear (effective at removing moisture from skin) and over which would be worn an insulating liner, and over that a parka and wind resistant trousers. Using outdoor clothing bought through catalogues from a variety of manufacturers, including The North Face, Army and Marine soldiers tried out the products in Vermont, where temperatures approached -25 degrees, and in Alaska, where the temperature reached -60 degrees. Ultimately, Natick settled on the garments it thought would meet the soldier's needs, commercially available products with only minor additions, such as new pockets and elbow patches.

Months before the Army formally announced in the Commerce Business Daily its intention to purchase new cold weather clothing on the commercial market, The North Face began preparing its response. "There's a sense in the industry that by the time something appears in the Commerce Business Daily, if you haven't already gotten a line on it, it's too late, because you've only got 30 days to do anything, typically," according to Dennis Riley, a Washington attorney on retainer to The North Face. He says that Caughron kept in contact with his military associates, attended industry association get-togethers and studied projections that government buyers publish of projected apparel purchases for the coming year. This projection is "wildly unreliable," Riley says, but "gives a sense of the dollars and the types of products that will be in their mix of contracts in the coming year." Also, the company was aware of the Army's plans because of purchases from The North Face for the Army-Marine evaluation.

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Approximately six companies bid for the firm fixed price contract and The North Face won a 50 percent share of the business. In July 1986 the company was awarded a contract for the manufacture of 4,551 cold weather shirts and 3,027 bib overalls.

The cold weather shirts and bib overalls looked simple to produce especially when compared with "super complex backpacks or tents or ski suits, that have to zip together around the waist, that have three different layers and five different materials," says Hamilton. "It's a one material hunk of fleece, plus thread." In fact, the bib half included a zipper on each leg and one on the crotch, and an attached suspender. Still, relative to the company's other products, it was a "very, very easy" job, says Castner, who started his career at The North Face working on the production floor and eventually became director of manufacturing.

Moreover, The North Face had produced thousands of similar garments both for the commercial and military markets. The shirt was similar to an item the company called its Armadilla Guide Sweater and the pants were a modified version of a pair of full-length fleece pants the company also sold commercially.[8] In addition, The North Face had designed modified versions of these garments for the military, and produced between 5,000 and 10,000 sets on a sole-source basis, some for Army and Marine Corps evaluation, and others to fill orders that came in from individual brigade commanders.

Military Specifications

The new contract for shirts and overalls bore an important resemblance to the company's first military contract. In both cases The North Face had to comply with a government supplied design, or "mil. spec." that precisely determined the details of how the garments were to be manufactured. The specifications included patterns, drawings, a narrative describing the materials needed, the packaging size and "a table of operations that tells someone how to put it together," according to Smedstad.

The specifications came from the campus-like setting of the Natick army lab, outside Boston. In essence, Natick engineers took a sample of the shirt and bib they wanted to order from The North Face and tried to find specifications, which the lab might have written for some other purpose, to match. If there were none, they wrote new ones. "I'll say [to the Natick materials department] 'This is a commercial item, but if there is a military specification,... we want to use it,"' Smedstad says. "If there's something that comes close, we can use that. If there is no specification for the cloth or something, one has to be made."

Natick required that the shirts and pants be made to its specifications to insure that the Defense Department received a quality product, according to Smedstad. "If we don't have a specification for them to follow, what do we inspect against," he asks.

> *All we're trying to do is to define the minimum requirements and have the contractors meet them, because that's what we need for the soldier. We also do it because we have to protect the taxpayer. The taxpayer's paying for all this, you and me and everybody.... In the event that XYZ company*

8 The military version of the pants were knicker length.

starts up with two sewing machines in the garage behind the house, bids on a contract which he can do legally, comes out with a lower bid, we want to make sure that he makes it right, too. It's designed for the competitive bidding system. We're trying to protect ourselves against some fly-by-nighter.

Smedstad was aware that there were likely to be problems with this a new specification such as this. To insure that there are as few problems as possible, Natick sends a draft version of the specifications to individual manufactures for comment, before the contract is bid. Compared with the paperwork and reviews necessary to change the specifications after the contract is signed, alterations at this stage are routine, and are, indeed, the purpose of the process. The preliminary mil. spec. for the shirt-pants combination was sent to The North Face in the summer of 1985 in order to anticipate any problems the company might have with the design.

When this material reached The North Face, communication within the company apparently broke down. The manufacturing department, which would be responsible for filling the order, was out of the loop. For unknown reasons, the proposed specifications never reached the company people best prepared to respond to Natick's initiative, according to Castner.

More serious still, The North Face manufacturing department was left completely unaware that the company was preparing to embark on a mil. spec. contract. Castner says he and his department were operating under the impression they were going to be producing additional quantities of the same cold weather shirt and pants they had already made in thousands of copies. The news that the garment now had to meet government specifications "took us by surprise," Castner laments. Had Castner and Hamilton been aware their company was preparing to accept a mil. spec. contract, and had they a chance to review it, they would have been better prepared for what was coining.

Filling the Order

The ink was barely dry on the contract when The North Face began running into problems. The contract included a standard clause to the effect that the government would provide the specifications within 30 days of the award. According to Riley, the specifications arrived two months later. "So even just [at] the beginning of the contract, there was not adequate documentation from the government as to what they were to have delivered."

Once the information did arrive, the company found itself unable to manufacture the garments in accord with Natick's specifications. The company found that the garment described in its 38-page government supplied "inspection manual" differed significantly from the thousands of sets it had already made for military use. "If you held the [old and new] garments at arm's length, if you wore the garments, they are the exact same garment, except that each and every component and detail [in the new order] had been specified," according to Hamilton. As a result, he adds, "we could not make it anymore." Although the garments looked the same, the specifications sufficiently changed the product to wreck havoc with the company's production line.

From then on, matters only got worse, company officials maintain. "They got into immediate problems once they received the patterns [because of the discrepancy] between the dimensions in the Contact specification for sizing and the dimensions on the patterns," Riley adds. "They (North Face) also went out and started buying components and found that some of the components [specified for the manufacture of the garments] were unavailable." In short, says Hamilton, "each component was specified, but in the specifying of each component, they didn't all go together to make a product."

A complaint that The North Face later filed before the Armed Services Board of Contract Appeals includes nearly two single spaced pages of specific grievances. The complaint, according to Riley, was filed after "nine months of total frustration trying to get the government to acknowledge that it had made mistakes in its specifications [and trying to work] out some way of resolving the extra costs." A letter included as an exhibit with the company's complaint states that The North Face "encountered government-caused delay during critical phases of performance" and describes "months of futile searching for nonexistent, unavailable specified components," all of which had "ruined our production schedule."[9]

To correct the apparent problems with the specifications the company sought exemptions, or waivers, from Natick. Riley, who has written widely on federal procurement, says "the government has a policy of no waivers, the theory [being] that a waiver is an invitation to deliver shoddy goods. Unfortunately it overlooks the fact that virtually all government specifications contain some errors; we call them defective specifications."

This policy does not prevent waivers from being issued, but it makes the approval process slow and laborious.

The issue of the proper thread with which to sew the garments together presented, perhaps, the biggest problem for the company. The mil. spec. mandated that The North Face use a polyester thread. But because of the thickness of the material being sewn, and the speeds at which the sewing machines operated, enough heat was generated to melt, then break, the thread. "We looked at it, we knew it could be a problem," says Castner. "We thought, well, this is the spec., we'll start off, we'll have our mechanic out here, maybe he can adjust the tension on the machines and the speed and stuff." But nothing seemed to work. 'They got out on the sewing floor, and all the threads started breaking, left and right," Castner recalls.

The North Face thought it knew, from experience, to use a cotton-polyester blend thread. The company, which offers its commercial customers a lifetime guarantee, sometimes receives gear the company made a dozen years earlier, returned for repair. Invariably, the product's thread was intact, according to Hamilton. "You wouldn't believe the thread we use over here," he says.

9 Letter dated January 30, 1987 to Roger Dixon, Defense Personnel Support, from Ray Caughron. The company, unsuccessfully, sought a total of $50,000 in compensation.

In order to use another thread, a waiver of the government specification was required. "We said, Why don't you just use the thread that we've used successfully for years?"' says Castner. The waiver was approved approximately one month later.

The company also encountered a delay because two specifications that should have matched didn't, according to a company official. The "markers," which textile makers use to measure the dimensions of the individual pieces of material that get sewn together did not match the dimensions specified for the final product, "We have an end spec: your sleeve has to be so long, you body has to be so long," Castner explains. "But the spec. that they had for the end product, and the spec. that they had for the marker, didn't mesh. You cut [the material] absolutely correct, you took the exact seam allowance, and you were going to be off."

The basic material that the garments were to be made of was also problematic. "The mill couldn't make it to spec., says Hamilton, "so we couldn't get the basic hunk of goods. The problem was that the thickness of the material was specified to a greater tolerance than natural variations in the brown fleece permitted. "It just couldn't be done," says Hamilton. "You'd get in a couple of rolls, they'd be OK. You'd get a few more and they wouldn't be OK. ... The thickness of the pile is going to keep you warm to a certain degree, but this is not measured like printed circuit boards, in thousands of an angstrom or anything," he laments. 'We're talking about: OK, it kind of keeps you warm. You know, its kind of thick." Again, the company had to await a waiver.

An elastic cord inside the pants also proved problematic. The North Face was unable to find a supplier with the elastic, called shock cord, with the specified tension to it. 'We could not find it, and we've bought shock cord for 15 years in the United States," Hamilton says. The company's usual vendors, "who supply shock cord to the world," could not meet the specification. "Couldn't make it stretch and recover enough...."

Other problems with the specifications included Zippers that were too long for the garments and labels that, as often as not, ripped when sewn into the garment. "The simplest little thing didn't work," recalls Hamilton.

Hamilton and Castner felt that their company should have been able to decide how to handle these problems on its own, without authority from Natick. "If I have a problem, it comes to me; I can, at this point, right now, decide what to do, and it's done, and let's go on with it," exclaims Castner, recalling his frustration.

Since the company lacked this autonomy, it entered a hold mode while it awaited approval to deviate from the inconsistent specification. Much to the chagrin of the manufacturing department, the company's sewing machines ground to a halt. "One you have a production line, and there are people sitting there, you don't want to stop. Because, what do you do with them?" Castner asks. "Do you send them home?" Yes, though The North Face did so reluctantly. "When I go to the company picnic," Castner says, "I see a couple of hundred kids running

around. Well, The North Face is responsible for all those kids, for being here, by providing a stable environment for families to thrive."

This inefficiency ran counter to everything the company was trying to do to save every penny possible in its commercial operation. Computers, for example, match up patterns to fit them together with fractionally less waste and elaborate devices move material from one sewing operation to another so skilled machine operators can spend one less minute at an unskilled task. "I better not have any fat around here," says Castner.

Although military sales originally held the promise of filling out the slumps in the company's seasonal production schedule, "of course, it doesn't work that way" Hamilton laments. Because of the numerous waivers of the original specifications that the company sought, the production was a start-and-start oration that dragged on longer than scheduled. According to Castner:

> *we shut the line down, we started it up. Probably every month, we did a little but here and there, because you'd have to wait for a waiver. You had to stop everything. And* sometimes the waiver *would take a week, a couple of days. Sometimes it would take a few weeks. The line was always out there. But it was always very non-productive.*

As a result of these production delays, the company got a late start making its fall and winter line, and North Face camping and ski wear products were consequently in short supply. "Most people who are going to go into a store, they want it that day, or maybe that week," Castner adds. "If it's not on the shelves, they'll buy something else."

What to Advise

On May 9,1988 The North Face was sold to a Hong Kong-based textile company, Odyssey International. The North Face's new owner was immediately faced with a major business decision: Should the Berkeley operation shed its military business? Although the new management would make the final decision, North Face executives would be relied upon for their advice.

At North Face's Harrison Street headquarters there were reasons to advise Odyssey to carry on with the military business, as well as cause for the opposite conclusion. For Jeff Kohr, the financial officer, the company's accounts suggested that the business was a good one, and should be continued. The company's gross margin on its shirt-pants contract turned out to be a respectable 25.6 percent. Although the company had a higher gross margin on its wholesale business, about 10 percent higher, this included the cost of sales staff commissions that were not applicable to government orders.[10] Overall, the company's military sales were "comparing quite favorably with other parts of our business," Kohr says. Moreover, the company was bound to master more of the intricacies of government contracting as it gained experience. From a strictly financial point of view, Kohr concludes: "I don't know t' .t ! would be put on the side of being real negative about the government business."

10 The exception was Raymond Caughron, whose expenses accounted for 10 percent of the contract cost.

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The North Face's military sales had increased slowly, but steadily, for more than 10 years. By 1987 they amounted to $3.2 million, or about 10 percent of the company's total manufacturing business on an overall volume of approximately $51.5 million.

On the other side of the ledger was the general frustration company executives felt regarding their defense business, a phenomenon that came to be referred to as the hassle factor. Particularly after the problems they had with the cold weather shirt and bib overall contract, this factor took on great importance. Centered in the manufacturing division, these problems, says Kohr,

> *were the kind of thing that would bother somebody so much, they wouldn't like what they were doing, and they would consequently be unhappy in their job, so to speak, and [it] probably impacted other aspects of the company.... (It) was frustrating enough in the long run to really have everybody down on government business.*

Two men, in particular, bore the brunt of the problems—Hamilton, who directed the manufacturing division and Castner, who was in charge of quality control. Hamilton had opposed the cold weather shirt and pants contract from the start, and after the order was filled he believed his doubts had been substantiated. For Castner, fulfilling the shirt-pants contract was a "disaster." He says that "from an efficiency standpoint, from a motivation standpoint, it was awful for my staff." The person in charge of production, he adds, was "just pulling his hair out."

From Castner's vantage point, in manufacturing, it seemed inconceivable, with all the starts and stops of the production line, that the company could have cleared a profit on the shirt-pants contract. "That's an interesting thing he [Kohr] said. It's hard for me to believe," Castner says, basing his conclusion on the frustration—the hassle—involved in making the garments.

Epilogue

Despite the overall profitability to The North Face of its military contracts, a general consensus arose at the Berkeley office to advise Odyssey, the company's new owner, that these sales should come to a dose. The income from the defense business was not large enough to compensate for the trouble it took to earn it. Second, internal management problems connected with The North Face's military orders compounded the difficulty most company officials were already having with this end of the business. "So it was a little bit of our own doing and a little bit of just the difficulty of dealing with the bureaucracy of the government, ..." Kohr concludes.

Even Kohr, who remained perhaps the strongest advocate for continuing the company's military sales, was persuaded to change sides over the hassle factor. He "didn't like, personally, what it was doing to the attitudes and the morale of the people in the factory," he says. "And for that reason I said, 'Yeah, if you want to get rid of it, fine.'"

More typical were the employees who had grown increasingly dissatisfied over the years. "I didn't think the potential rewards were worth the hassles," says Jack Gilbert, who had been

with the company since it was founded. "And that position got stronger as time went on, and I listened to the horror stories... [about] the bureaucracy and the complications of dealing with the government."

Personality conflicts and incompatible management styles also contributed to the firm's negative attitude toward its defense business. Caughron, who managed military sales, sometimes did not enter information into The North Face's computer accounting system, for example, and, in general failed to "win friends and influence people," as one official put it. "I think Ray certainly had his heart in the right place," another said, but added "Ray was seen as kind of this representative of the government business and he was a little difficult to deal with, and then the government business, with the specifications and so on, was difficult to deal with, and on some of this we weren't making a lot of money, so it was like, 'Well, let's just not deal with this.'"

These considerations overrode the vast potential for additional military sales. According to Hamilton there was no shortage of large markets The North Face could enter. The trick was to pick the one best suited to the company. He had to "pick and choose very carefully, 'Where do I want to put my resources?'" Women's blouses, which he says is a $5 billion market, for example, "doesn't tempt me at all. But neither, at the moment, does government uniforms." The reason is that it diverts the company's resources from the products for which it is known best. "Do I want my development people over here improving the backpack? Making a better tent? Or do I want them three months working on a government gaiter?"

Moreover, the early promise of using government evaluations of The North Face's products to aid the development of its commercial product line did not pan out. Although some of the company's military sales efforts provided useful information, in general the data the company needed for this purpose was not easily obtainable from government sources.

In addition, a host of other factors contributed to the consensus recommendation that Odyssey discontinue The North Face's defense sales. Generally, the company's sole source contracts were more profitable than those it bid for, in large part because the sole-source contracts were for non-mil. spec. items. But the company became ineligible for many of these sole source awards. Two things happened about that time: The North Face's status as a "small business" (as defined by federal guidelines) was disputed, just as many military textile contracts were starting to be awarded on the basis of the government's special small business set-aside program.

Also, at a time of declining company profits for The North Face, it was particularly important for company officials to avoid the sharp peaks and valleys that typically show up on the balance sheet of government contractors. Although company officials had once looked forward to matching the cycle of government production with their own periods of slack commercial production, this forecast proved overly optimistic and the North Face was unable to escape the usual financial ups and downs of military contracting. "When you can't forecast the time at which you're going to make an item, and you don't know what the time is going to be, and you

don't know what time you're going to have to make it, it's very hard to run a business that way," says Lee Turlington, who handled the company's early military sales.

Finally, true to its Berkeley roots, the company was never able to generate the same "warm and fuzzy" feeling for military contracting, says Turlington, as it had for its traditional product line.

The advice to Odyssey, then, was to terminate The North Face's military sales, which occurred shortly thereafter.[11] Although the decision came from Hong Kong, it did not come out of the blue, according to Gilbert: "It wasn't like a unilateral decision from left field. It was pretty much driven by the same people who had been opposed to the business before the company was sold."

11 Caughron's position was terminated at this time.

Appendix B
NDI SURVEY

DEFENSE SYSTEMS MANAGEMENT COLLEGE RESEARCH FELLOWSHIP PROGRAM

Nondevelopmental Items Survey

The Defense Systems Management College Research Fellows are currently collecting information for use in their research project. The research project is centered around the use of nondevelopmental items (NDI) in defense acquisition. The Research Fellows are seeking information from acquisition program managers as to their knowledge of NDI and the use of NDI in their respective programs.

The NDI Survey will be used to develop the overall understanding of NDI in the Department of Defense, the level of implementation of NDI in defense acquisition programs and common impediments to the use of NDI. The information provided to the Research Fellows will be used on a nonattribution basis.

The objectives of the survey are:

—Analyze the acquisition community's knowledge and perspective of nondevelopmental items,

—Evaluate the implementation of congressional language, Department of Defense and Service-unique regulations for NDI usage,

—Identify the magnitude of NDI usage in defense acquisition,

—Identify critical impediments to NDI use in defense acquisition,

—Recommend/provide revisions to current DOD guidance to improve/increase NDI usage.

We have asked you, the program managers, to give us your feelings on these issues because we hope to address your problems in fulfilling the objective of maximizing NDI usage in DOD acquisition. We solicit your experience, comments, insight and advice in carrying out our research. Please mail this survey to the address below or call us on the listed numbers. Thank you for your time, effort and valuable input.

Defense Systems Management College
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Fort Belvoir, VA 22060-5426
(703) 805-2525/2289
DSN 655-2525/2289

Research Fellows:
LTC C. Adams, USA
LTC J. Emerson, USA
LtCol B. Hevey, USAF
CDR R. Shaw, USN

SURVEY QUESTIONS

INSTRUCTIONS: Please answer the following questions concerning nondevelopmental items. Questions 2-8 require you to circle your choice and comment as necessary.

1. The use of NDI (nondevelopmental items) in DOD systems acquisition has been mandated through studies by the Packard Commission and, more recently, in congressional language. In response to this mandate, OSD and the Services have developed directives and instructions concerning NDI usage in system acquisitions. Examples of such documentation are: SD-2, "Buying NDI"; DOD Instruction 5000 Series; Federal Acquisition Regulations (FARs) and Defense Federal Acquisition Regulations (DFARs); Army Regulation 70-1; Air Force Regulations; and SECNAV Instruction 4210.7a. **Based on your experience in DOD systems acquisition, please identify any documentation which you used or were familiar with pertaining to NDI use in your programs. If your program did not use such a document or you are unfamiliar with such documents, please state that also.**

2. **Do you feel the acquisition community has established a well-defined and publicized process for promoting the maximum use of NDI in DOD acquisitions?**

YES 5 4 3 2 1 NO

Comments:

3. Given congressional mandates, Service directives and other such emphasis on NDI, **how strongly do you feel that (as a program manager) you have really been given the tools (authority, resources, flexibility, etc.) to maximize the use of NDI acquisition strategies in DOD system acquisitions?**

VERY STRONGLY 5 4 3 2 1 NOT STRONGLY

Please provide a brief comment on what you personally feel are impediments to NDI use in DOD acquisition, in general, or your program specifically.

Comments: _____

_____

_____

_____

4. The inability of potential NDI systems to meet stated user performance requirements is often an early disqualifier in adopting an NDI acquisition strategy. **How well do you think the developers and users are doing at performing NDI cost/schedule vs. performance trade-off analyses before disqualifying an NDI system or component?**

VERY WELL 5 4 3 2 1 NOT WELL

Comments: _____

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5. An often-noted impediment to NDI strategy is the structure of the Planning, Programming and Budgetary System (PPBS), especially relating to lead times, funding windows and appropriate type. **How significant an impediment do you feel the PPBS process is to efficient implementation of an NDI acquisition strategy?**

VERY SIGNIFICANT 5 4 3 2 1 NOT SIGNIFICANT

Comments: _____

_____

_____

_____

_____

6. **Integrated logistics support (ILS) considerations also have been noted as major concerns relative to choosing an NDI acquisition strategy. In your experience, how significant an impediment has ILS been in considering an NDI component or system acquisition? If significant, please provide a brief comment describing the situation.**

VERY SIGNIFICANT 5 4 3 2 1 NOT SIGNIFICANT

Comments:_____

_____

_____

_____

_____

7. The use of NDI in DOD system acquisitions has been effected by stringent government test and evaluation procedures. **To what degree are government testing requirements an impediment to the acquisition of NDI?**

VERY SIGNIFICANT 5 4 3 2 1 NO EFFECT

Comments:_____

_____

_____

_____

_____

8. The rapid input of advanced technologies in the commercial marketplace have significantly shortened life cycles for equipment. As a result of changing technology, the stability of component configuration should be addressed when DOD system acquisitions seek to use NDI. **In your program, has configuration management been a problem related to the use of NDI or commercial specifications for components in the program?**

VERY SIGNIFICANT 5 4 3 2 1 NO EFFECT

Comments:_____

_____

_____

_____

_____

Appendix C
INTERVIEWS AND PERSONAL CONTACTS

Arnold, Alfred, LTC, USA
Product Manager, CTASC2
Project Management Office, TACMIS
Fort Belvoir, VA

Beaham, Lawrence L.
Product Manager,
Commercial Vehicle Derivatives
GMC Truck Division
Warren, MI

Behn, Gordon C.
Purchasing Agent
General Motors Corporation
Warren, MI

Bennett, James H., COL, USA
Director Fielded Aviation Systems
U.S. Army Aviation Systems Command
St. Louis, MO

Bergemann, Ralph V.
Program Manager,
Future Vans Truck and Bus Group
General Motors Corporation
Pontiac, MI

Bleau, Richard O.
Assistant Deputy Chief of Staff,
Acquisition Logistics
Electronics Systems Division
Hanscom AFB, MA

Bramlette, Larry, COL, USA
Director,
Acquisition Enhancement Program
Defense Systems Management College
Fort Belvoir, VA

Brown, Steven, Lt Col, USAF
Directorate of Transports,
Aircraft System Program Office
Aeronautical Systems Division
Wright-Patterson AFB, OH

Butt, Warren
Computer Systems Analyst
Defense Construction Supply Center
Columbus, OH

Campbell, Robert
Team Leader, Mission Support Equipment
Aviation Applied Technology Directorate
U.S. Army Aviation Systems Command
Fort Eustis, VA

Cann, Gerald A.
Assistant Secretary of the Navy
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Carey, Mitch
Chief
Testing Commercial Aircraft for
Military Applications
4950th Test Wing, Aeronautical Systems
Division
Wright-Patterson AFB, OH

Christensen, Craig, Lt Col, USAF
4950th Test Wing, Aeronautical Systems Division
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Chu, David S. C.
Assistant Secretary of Defense
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Circle, David
Supply Systems Analyst
Defense Construction Analyst
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Collett, Larry
Contracting Officer,
New Training Helicopter
U.S. Army Aviation Systems Command
St. Louis, MO

Collier, James
Aerospace Engineer
Air-To-Air Integration Office
Program Executive Office, Aviation
St. Louis, MO

Cosgray, Steven
Procurement Analyst
Directorate Fielded Aviation Systems
U.S. Army Aviation Systems Command
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Crowson, Fred
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Assistant Deputy Under Secretary of the Navy (Safety and Survivability)
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Day, Lawrence W., Jr., COL, USA
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Medium Tactical Vehicles
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Delarm, Randy F.
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Quantico, VA

Demel, Steven, Lt Col, USAF
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Quality Assurance
Defense Logistics Agency
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Fink, David
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Defense Construction Supply Center
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Franke, Richard E.
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Office of the Secretary of Defense
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Gershman, Steve
Logistics Manager (SEA 91L)
Surface Combatant Directorate
Naval Sea Systems Command
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Giasson, Charles B., COL, USA
Program Manager,
Tactical Management Information Systems
PEO Standard Army Management
Information Systems
Fort Belvoir, VA

Gliatta, Leonard, LTC, USA
Product Manager,
Automatic Identification Technology
Program Management Office TACMIS
Fort Belvoir, VA

Green, Gerald, COL, USA
Project Manager
Utility Helicopter
Program Executive Office, Aviation
St. Louis, MO

Griffiths, John J.
Weapon System Manager for Ground
Support Equipment
U.S. Army Aviation Systems Command
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Harbort, Walter, Jr.
Attorney-Advisor (Contracts)
U.S. Army Communications-Electronics
Command
Fort Monmouth, NJ

Harper, Tom, Lt Col, USAF
Director,
Joint Primary Aircraft Training System
Flight Training System Program Office
Aeronautical Systems Division
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Hollowell, Paul C.
Vice President and General Manager,
Defense Systems
Oshkosh Truck Corporation
Oshkosh, WI

Inskeep, James, LTC, USA
Project Officer,
Installation Transition Processing
Project Management Office TACMIS
Fort Belvoir, VA

Ivanson, Kenneth J.
APM Army Global Positioning System
Los Angeles Air Force Base
Los Angeles, CA

Jordan, Robert W.
Manager,
Contracts, Military Vehicles Operation
GMC Truck Division
Warren, MI

King, Ted, Major, USAF
Joint Primary Aircraft Training System
Program
Flight Training System Program Office
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